COYOTE CREEK CHILLED WATER PLANT
SANTA CLARA VALLEY WATER DISTRICT (VALLEY WATER)
MORGAN HILL, CALIFORNIA

GEOTECHNICAL DESIGN REPORT

SUBMITTED TO
Mr. Ron Walz, PE
Kennedy/Jenks Consultants, Inc.
1201 2nd Avenue, Suite 700
Seattle, WA 98101

PREPARED BY
ENGEO Incorporated

June 8, 2021

PROJECT NO.
18216.000.001

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18216.000.001

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Mr. Ron Walz, PE
Kennedy/Jenks Consultants, Inc.
1201 2nd Avenue, Suite 700
Seattle, WA 98101

Subject: Coyote Creek Chilled Water Plant
Santa Clara Valley Water District (Valley Water)
Morgan Hill, California

GEOTECHNICAL DESIGN REPORT

Dear Mr. Walz:

Per your authorization, we have prepared this geotechnical report for the Santa Clara Valley Water District's (Valley Water's) Coyote Creek Chilled Water Plant Project in Morgan Hill, California. The proposed Chilled Water Plant will help regulate the water temperature in Coyote Creek. This report summarizes the findings from our geotechnical exploration and laboratory testing program, characterizes site conditions, and provides geotechnical recommendations for design.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Siobhan O'Reilly-Shah, PE

Seema Barua, PE

Reviewed by:

G. 'Neel' Neelakantan, PhD, GE

sos/sb/gn/cjn

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

We prepared this geotechnical report for the design of Valley Water's proposed Coyote Creek Chilled Water Plant Project ("Project") as outlined in our agreement with Kennedy/Jenks Consultants dated December 28, 2020. The proposed Chilled Water Plant will help regulate the water temperature in Coyote Creek. We developed our scope to present our geotechnical recommendations for design and construction of the proposed Project. Our scope of work included:

1. The review of relevant background information, including available literature, geologic maps, and geotechnical reports pertinent to the site.
2. Subsurface field exploration.
3. Laboratory testing of select samples collected during the field exploration.
4. The evaluation of geotechnical conditions and performing analyses of collected data.
5. The preparation of a geotechnical report to present our findings and conclusions and to provide geotechnical recommendations for the design and construction of the Project.

We reviewed the following documents in the preparation of this design report.

1. Kennedy/Jenks Consultants, Inc.; Coyote Creek (3) 1300T Chiller Option, Coyote Creek Chiller Project, Received February 25, 2021.
2. Kennedy/Jenks Consultants, Inc.; Site Selection Record Drawing, Coyote Creek Chiller Project, Site Selection Workshop, January 25, 2021.
3. American Chiller Service, Inc. (ACS); Preliminary Layout & Equipment Selection, Coyote Creek 3200 Ton Chilled Water Plant; September 22, 2020; Project No. 56424.
4. U.S. Department of the Interior, Bureau of Reclamation; Geologic Design Data Report; Coyote Pumping Plant, San Felipe Division, Central Valley Project, California; January 14, 1983.
5. Earth Sciences Associates; Cross Valley Pipeline and Anderson Distributary Geotechnical Investigation, Volume I; June 1979.

This report was prepared for the exclusive use of Valley Water, Kennedy/Jenks Consultants, Inc., and their consultants for design of this Project. In the event that any changes are made in the character, the design, or the layout that could impact the geotechnical conclusions and recommendations provided in this report, we should be provided the opportunity to review the conclusions and recommendations contained in this report to evaluate whether modifications may be necessary.

1.2 PROJECT LOCATION AND DESCRIPTION

We understand that the proposed Chilled Water Plant will be located at the Valley Water's Coyote Pump Plant at 18300 Peet Road in Morgan Hill, California. According to the Coyote Creek (3) 1300T Chiller Option package, the proposed Chilled Water Plant will include four shipping containers containing three chiller plants, water pumps, electrical equipment, and associated piping. There will also be non-retaining boundary walls that will enclose the entire plant for privacy and noise considerations. No underground retaining structures are currently proposed for the Project.

The Chilled Water Plant site is located near the southwest corner of the Coyote Pump Plant. A Site Vicinity Map is shown in Figure 1. We observed that the site currently appears to be a storage space for trailers and other utility vehicles. Our review of available historical aerials indicate that the site was used for agricultural activities for some period between 1953 and 1982. By 1987, a few buildings associated with the Coyote Pump Plant are visible to the east of the site, and the site appears to be vacant. Aerial photographs from 1987 to 2016 indicate that the site remains relatively unchanged and resembles current site conditions.

The Coyote Pump Plant is generally bordered by an on-going residential construction site to the north and east, agricultural land and residential houses to the west, and Peet Road to the south. Directly north and east of the proposed Chilled Water Plant site are buildings, storage warehouse, and facilities associated with the Coyote Pump Plant. We show site boundaries and our exploration locations in Figures 2 and 3.

2.0 FINDINGS

2.1 PREVIOUS STUDIES

Previous studies and field explorations were performed near the site in 1979, 1983, and 2012. We reviewed available relevant information from these previous studies and considered select data in developing our analyses. Explorations from the previous studies are shown in Figure 3, Exploration Site Plan, and the select exploration logs from the 1979 and 1983 studies are included in Appendix D. Once we receive authorization from the client for the 2012 exploration, we will add these logs to Appendix D.

In 1979, Earth Sciences Associates conducted a Geotechnical Investigation for the Cross Valley Pipeline and Anderson Distributary alignment. The subsurface exploration consisted of numerous auger borings, rotary core borings, test pits, and seismic refraction surveys along the proposed alignment. A portion of the proposed alignment runs along the eastern side of the Coyote Pump Plant. We reviewed the data obtained from the test pits and auger borings performed near the Coyote Pump Plant.

In 1983, the United States Bureau of Reclamation prepared a Geologic Design Data Report for the Coyote Pump Plant. Their exploration consisted of seven test pits, two core drill holes, four electrical resistivity tests, and two seismic refraction surveys. This exploration was performed on the Coyote Pump Plant site near the location of the proposed Chilled Water Plant.

In December 2012, we prepared a Geotechnical Investigation for the San Sebastian Development to the north and east of the Project site. The exploration included nine hollow stem auger borings and ten test pits.

2.2 REGIONAL GEOLOGY

The site is located on the west flank of the Diablo Range foothills of the Coast Range geomorphic province, prominent northwest-trending mountains defining the eastern boundary of Santa Clara Valley. The Santa Clara Valley region lies to the east of the San Andreas Fault and to the west of the Hayward and Calaveras Faults.

Regional mapping by Dibblee (2005) indicates the site is underlain by undifferentiated Quaternary-age alluvium (Qa) consisting of gravel, sand and clay. Regional geologic mapping by Wentworth (1999) maps the site as underlain by upper Pleistocene age Alluvial fan deposits (Qpf) consisting of tan to reddish brown gravel that is supported with a clayey and sandy matrix. A geologic map of the Project site region is shown in Figure 4.

2.3 SITE SEISMICITY

The region surrounding the Project site contains numerous active earthquake faults. The California Geologic Survey (CGS) defines an active fault as one that has had surface displacement within Holocene time (about the last 11,000 years) (CGS SP42, 2018). The Working Group on California Earthquake Probabilities (WGCEP, 2017) evaluated the 30-year probability of a Moment Magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area in the Third Uniform California Rupture Forecast (UCERF3). UCERF3 estimated an overall probability of 72 percent for the Bay Area as a whole, 14.3 percent for the Hayward Fault, 7.4 percent for the Calaveras Fault, and 6.4 for the Northern San Andreas Fault.

To determine nearby active faults that are capable of generating strong seismic ground shaking at the site, we utilized the United States Geological Survey (USGS) Unified Hazard Tool and disaggregated the hazard at the peak ground acceleration (PGA) for a 2,475-year return period, with the resulting faults listed below in Table 2.3-1. The locations of the faults are also presented in Figure 5. The closest distance to the rupture plane (rupture distance) (R_{RUP}) is measured from the location listed below.

TABLE 2.3-1: Active Faults Capable of Producing Significant Ground Shaking at the Site
Latitude: 37.158203; Longitude: -121.638346

SOURCE	RANGE OF R_{RUP} (MILES, EAST TO WEST)	M_W
Calaveras (Central) [3]	3.6	7.10
Hayward (So) extension [0]	6.0	6.61
San Andreas (Santa Cruz Mts) [3]	11.6	7.84

Based on USGS Unified Hazard Tool: Dynamic Conterminous U.S. 2014 (update) (v4.2.0)

The faults listed above represent sources contributing at least one percent to the seismic hazard at the site at the PGA and for the given return period. Gridded or areal sources are not presented.

The Project site is not located within a currently designated State of California Earthquake Fault Hazard Zone or a Santa Clara County Hazard Zone, and no known active faults across the site. The USGS Fault and Fold Database (QFFD) maps the Coyote Creek Fault approximately ½ mile northeast of the Project site. The Coyote Creek Fault is identified as at least Quaternary in age (less than 1.6 million year), but not considered active according to State of California criteria.

2.4 FIELD EXPLORATION

To characterize subsurface conditions, we advanced three borings at the proposed Chilled Water Plant site at the locations shown on the site plans in Figures 2 and 3. We observed the drilling and logged the subsurface conditions on February 3, 2021. We retained a track-mounted drill rig and crew to advance the borings using mud-rotary drilling method with a 4½-inch diameter hole. The borings were advanced to depths of approximately 30 feet below ground surface (bgs). The boreholes were backfilled in accordance with Valley Water requirements.

We collected soil samples using either a 2½-inch inside diameter (I.D.) California-type split-spoon sampler fitted with 6-inch-long steel liners or a 2-inch outside diameter (O.D.) Standard Penetration Test (SPT) split-spoon sampler. We recorded the penetration of the sampler into the subsurface material as the number of blow counts needed to drive the sampler 18 inches in 6-inch increments with a 140-pound hammer through a 30-inch free-fall employing an automatic trip system. Unless otherwise indicated, the blows per foot recorded on the boring logs represent the accumulated number of blows to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors.

Our final boring logs are presented in Appendix A. The logs depict subsurface conditions at the exploration locations at the time of the exploration; however, subsurface conditions may vary over time.

2.5 SURFACE CONDITIONS

During our site reconnaissance, we observed that the site is currently undeveloped and generally covered in surficial soil that is moist, loose, and disturbed, containing some organics. The site is relatively flat, with an average elevation of 414 feet (WGS84). All elevations referred to in this report are relative to the WGS84 Datum.

2.6 SUBSURFACE CONDITIONS

The subsurface conditions at the proposed Chilled Water Plant site generally consist of dense to very dense sand and gravel interbedded with medium stiff to hard lean clay. We encountered an approximate 2 to 4 foot blanket of loose and disturbed soil containing organic material across the site, possibly associated with previous agricultural operations commencing as early as 1953 and grading activities for the current Coyote Pump Plant. Test pit logs from the previous explorations performed within the Coyote Pump Plant indicate clayey sand topsoil was encountered in approximately the upper 2 to 3 feet, and existing fill was not encountered in previous explorations performed near the subject site. Additionally, cobbles (3 to 12 inches in diameter) and trace boulders (12 to 19 inches in diameter) were encountered beginning at a depth of approximately 2 feet in explorations previously performed near the Project site. The soil conditions encountered in our borings are consistent with geologic conditions in the mapped region and with previous explorations.

We have included our boring logs in Appendix A. The logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The subsurface conditions encountered at the time of the exploration are graphically depicted on our boring logs.

2.7 GROUNDWATER CONDITIONS

We did not measure groundwater during drilling due to the mud rotary drilling method. The Seismic Hazard Zone report for Morgan Hill Quadrangle (2004) indicates the historic high groundwater in the Project vicinity is approximately 65 feet bgs. Groundwater monitoring data viewed online through Valley Water's groundwater elevation database at https://gis.valleywater.org/GroundwaterElevations/ indicates that the groundwater depth in the Project vicinity has varied between 35 and 200 feet over time. Groundwater was measured at approximately 25 feet bgs in a boring drilled during the 1983 geotechnical study at the Coyote Pump Plant. The large variation in historic data suggests significant seasonal variations of the groundwater surface are possible at the Project site.

2.8 LABORATORY TESTING

We performed geotechnical laboratory testing on select soil samples recovered during our field exploration to evaluate their physical index properties and strength characteristics. The laboratory tests that were performed and the associated ASTM procedures are shown in Table 2.8-1.

TABLE 2.8-1: Laboratory Testing

LABORATORY TEST	TESTING METHOD
Moisture Content	ASTM D2216
Unit Weight and Moisture Content	ASTM D7263
Atterberg Limits	ASTM D4318
Sieve and Hydrometer	ASTM D6913
Fines Content	ASTM D1140
Isotropic Triaxial Compression	ASTM D2850

Our laboratory test results are presented in Appendix B, and select test results are included on the boring logs in Appendix A.

In addition, we collected shallow soil samples from Boring 1-B2 and submitted them to Sunland Analytical under a chain of custody for corrosivity testing. The corrosion test results from Sunland Analytical are summarized in Section 3.5 and included in Appendix C.

3.0 DISCUSSION AND CONCLUSIONS

We evaluated the site with respect to known potential geologic and geotechnical hazards common to the greater San Francisco Bay Region. We discuss the primary hazards, their anticipated risk of occurrence, and potential impacts on the proposed Project in the following sections.

3.1 GROUNDWATER CONDITIONS

As described in Section 2.7, the historical groundwater data in the Project vicinity indicates large fluctuations in groundwater level are possible within a short time period. For purposes of the planning and design of the Project, we recommend that an estimated design groundwater depth of 35 feet bgs be considered.

3.2 EXPANSIVE SOIL

Expansive soil changes in volume with changes in moisture. It can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. We performed sampling and testing of near-surface soil at the site to characterize the physical properties in relation to expansion potential. Our geotechnical laboratory test results indicate that the soil at the Project site exhibits a low expansion potential, and consequently we do not consider expansive soil to have an impact on the Project.

3.3 LOOSE SURFICIAL SOIL

The Project site was previously used for agricultural operations from at least 1953 and graded in the mid- to-late 1980s for construction of the Coyote Pump Plant. The surficial loose and disturbed soil containing organic material in the upper 2 to 4 feet extending across the site likely results

from the previous agriculture use and site grading. Test pit logs from the previous explorations performed within the Coyote Pump Plant indicate clayey sand topsoil was encountered in approximately the upper 2 to 3 feet, and existing fill was not encountered in previous explorations performed near the subject site.

Loose and disturbed soil could undergo settlements that are not easily characterized and could ultimately be inadequate to effectively support the proposed loads. In general, loose and disturbed soil should be excavated and replaced as engineered fill. Recommendations for mitigating the loose surficial soil at the subject site are discussed in Section 4.1 of this report.

3.4 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, soil liquefaction, and lateral spreading. We discuss these hazards in the following sections.

3.4.1 Ground Rupture

The site is not located within a State of California Earthquake Fault Hazard Zone or a Santa Clara County Hazard Zone, and no known active faults cross the site. Therefore, it is our opinion that ground rupture is unlikely at the subject site.

3.4.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region, similar to those, which have occurred in the past, could cause considerable ground shaking at the site. To mitigate the shaking effects, all structures should be designed using sound engineering judgment and the latest California Building Code (CBC) requirements as a minimum.

Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally substantially smaller than the expected peak forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural, as well as nonstructural damage (SEAOC, 1996). Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that well-designed and well-constructed structures will not collapse or cause loss of life in a major earthquake.

3.4.3 Soil Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. The soil most susceptible to liquefaction is clean, loose, saturated, uniformly graded fine sand below the groundwater table. When seismic ground shaking occurs, the soil is subjected to cyclic shear stresses that can cause excess pore pressures to develop thereby by reducing effective stresses causing liquefaction of susceptible soil to occur.

Our review of the Seismic Hazard Zones Map for the Morgan Hill Quadrangle (CGS, 2004) indicates that the site is not located within a mapped liquefaction zone (Figure 6). Our field exploration encountered predominantly dense to very dense granular material, which confirms the CGS non-liquefaction mapping; therefore, we consider the risk of liquefaction at the site to be low.

3.4.4 Dynamic Densification

Dynamic densification settlement of loose granular soil above the groundwater table, also known as dry sand settlement, can cause settlement of the ground surface due to earthquake-induced ground motions. Our field exploration encountered predominantly dense to very dense granular material above the design groundwater depth of 35 feet; therefore, we consider the risk of dynamic densification at the site to be low.

3.4.5 Lateral Spreading

Lateral spreading is a liquefaction induced ground deformation in which near surface soil layers typically break into blocks that progressively move downslope or toward a nearby free surface such as a stream channel, river embankment, or shoreline. Underground facilities and structural elements (e.g., pipelines, spread footings, etc.) that extend through or across a zone of lateral spreading may be pulled apart or sheared. Generally, the effects of lateral spreading are most significant at the free face or the crest of a slope and diminish with distance from the slope. Based on site topographic and subsurface conditions coupled with very low liquefaction potential, we consider the risk of lateral spreading at the site to be low.

3.5 2019 CALIFORNIA BUILDING CODE SEISMIC PARAMETERS

The 2019 CBC utilizes design criteria set forth in the 2016 ASCE 7-16 Standard. Based on our review of the previous geotechnical exploration, the results of our geotechnical exploration and our experience in the Project area, we characterized the site as Site Class D in accordance with the 2019 CBC. We provide the 2019 CBC seismic design parameters in Table 3.5-1, which include design spectral response acceleration parameters based on the mapped Risk Targeted Maximum Considered Earthquake (MCER) spectral response acceleration parameters.

TABLE 3.5-1: 2019 CBC Seismic Design Parameters
Latitude: 37.158203; Longitude: -121.638346

PARAMETER	DESIGN VALUE
Site Class	D
Mapped MCE_R spectral response accelerations for short periods, S_S (g)	1.93
Mapped MCE_R spectral response accelerations for 1-second periods, S_1 (g)	0.71
Site Coefficient, F_A	1.00
Site Coefficient, F_V	Null*
MCE spectral response accelerations for short periods, S_{MS} (g)	1.93
MCE spectral response accelerations for 1-second periods, S_{M1} (g)	Null*
Design spectral response acceleration at short periods, S_{DS} (g)	1.29
Design spectral response acceleration at 1-second periods, S_{D1} (g)	Null*
Mapped MCE Geometric Mean Peak Ground Acceleration (g)	0.81
Site Coefficient, F_{PGA}	1.10
MCE Geometric Mean Peak Ground Acceleration, PGA_M (g)	0.89

**Requires site-specific ground motion hazard analysis per ASCE 7-16 Section 11.4.8*

If the fundamental periods of the proposed structures are less than $1.5T_s$ (where T_s is 0.62 seconds for this Project), the structural engineer may consider exception(s) of Section 11.4.8 of ASCE 7-16 as follows:

> "A ground motion hazard analysis is not required for structures… where, structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Eq. (12.8-2) of ASCE 7-16 for values of $T \leq 1.5T_S$ and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) of ASCE 7-16 for $1.5T_s < T \leq T_L$."

We recommend that we collaborate with the structural engineer of record to further evaluate the effects of taking the exceptions on the structural design and identify the need for performing a site-specific seismic hazard analysis. We can provide a scope for site-specific seismic hazard analysis and ground motion study under separate cover, if needed.

3.6 CORROSIVITY CONSIDERATIONS

We collected near-surface soil samples and transported them to Sunland Analytical, Inc. for corrosivity laboratory testing. We summarize the results in Table 3.6-1, and the laboratory test results prepared by Sunland Analytical, Inc. are included in Appendix C.

TABLE 3.6-1: Soil Corrosivity Test Results

SAMPLE NUMBER AND DEPTH (FEET)	REDOX POTENTIAL (MV)	pH	RESISTIVITY (OHM-CM)	SOLUBLE SULFATE* (MG/KG)	CHLORIDE ION* (MG/KG)	SULFIDE (MG/KG)
1-B2 @ 2½'	240	6.51	2,680	18.1	4.7	ND
1-B2 @ 3'	246	6.33	3,480	10.2	3.8	ND

**Results reported on a wet weight basis*

Based on the resistivity measurements, the soil is considered moderately corrosive to buried metal (NCHRP, 1978). The CBC references the American Concrete Institute Manual, ACI 318-14 for structural concrete requirements. According to Table 19.3.1.1, this soil is categorized as S0 sulfate exposure class.

4.0 EARTHWORK RECOMMENDATIONS

The relative compaction and optimum moisture content of soil and aggregate base referred to in this report are based on the most recent ASTM D1557 test method. Compacted soil is not acceptable if it is unstable. It should exhibit only minimal flexing or pumping, as observed by our field representative. The term "moisture condition" refers to adjusting the moisture content of the soil by either drying if too wet or adding water if too dry.

4.1 GENERAL SITE CLEARING AND LOOSE SOIL REMOVAL

Site preparation should commence with removal of any loose disturbed soil, vegetation, and surface and subsurface improvements. We estimate that up to approximately 4 feet of the near-surface soil at the site will need to be removed and recompacted. The actual extent of such removal and recompaction should be determined during construction. The loose soil should be removed to a minimum of 5 feet beyond site improvements. Tree rootballs should be removed to a depth of at least 3 feet below finished grade. Vegetation and debris should be stockpiled separately from excavated soil material. The contractor should clean and backfill excavations

extending below the planned finished grade with suitable material compacted to the recommendations presented in Sections 4.3 and 4.4. No loose or uncontrolled backfilling of depressions resulting from demolition and stripping is permitted.

Oversized soil or rock materials (those exceeding two-thirds of the lift thickness or 6 inches in dimension, whichever is less) are anticipated to be encountered during grading. Where feasible, alluvial cobbles and boulders with a maximum dimension of greater than 6 inches should be removed and can be broken down to meet engineered fill requirements in Section 4.3. Larger alluvial cobbles and boulders can likely be broken mechanically by heavy bulldozers rolling on them or by a pneumatic hammer mounted on a backhoe. If this is not desirable, larger cobbles and boulders can be placed in nonstructural fills, used for landscaping, or removed from the Project site.

From our review of the Site Selection Record Drawing provided by Kennedy/Jenks, we understand that existing pipelines and vaults are located near the Chilled Water Plant site. We anticipate that the excavations for removal of loose and disturbed soil will not affect nearby existing pipelines and vaults. If excavations are deeper than 4 feet during construction, excavations should be monitored to detect any evidence of instability and should include the monitoring of nearby utilities and structures.

4.2 SUBGRADE PREPARATION

Subgrade for pipe bedding or foundations, should be prepared in a manner that provides a relatively flat, dry, and firm uniform working surface. If any unsuitable material, such as soft clay or silt, soil containing organic material, debris, or other deleterious material is encountered at subgrade, it should be removed (i.e., over-excavated) and brought back to grade with compacted engineered fill in accordance with Sections 4.3 and 4.4. Prior to fill placement, the contractor should scarify, moisture condition, and compact the subgrade in accordance with Section 4.4.

4.3 ENGINEERED FILL MATERIAL

With the exception of construction debris (wood, brick, asphalt, concrete, metal, etc.), trees, organically contaminated material (soil which contains more than 3 percent organic content by weight), and otherwise unsuitable soil, we anticipate the site soil is suitable for use as engineered fill. Unsuitable material and debris, including trees with their roots and particles larger than 6 inches, should be removed from the Project site. Oversized soil or rock material (those exceeding two-thirds of the lift thickness or 6 inches in dimension, whichever is less) should be removed from the fill and broken down to meet this requirement or otherwise off-hauled. Oversized materials such as cobbles and boulders may be broken down as described in Section 4.1 prior to use in engineered fill.

Imported fill material should meet the above requirements and have a plasticity index (PI) less than 12.

4.4 FILL PLACEMENT

After removing loose surficial material as directed in Section 4.1, the contractor should perform subgrade compaction prior to fill placement as described in Section 4.2. The contractor should first scarify at least 8 inches, then moisture condition and compact the subgrade in accordance with Table 4.4-1.

The contractor should then place engineered fill in loose lifts that do not exceed 8 inches or the depth of penetration of the compaction equipment used, whichever is less. The contractor should then moisture condition and compact engineered fill in accordance with Table 4.4-1.

TABLE 4.4-1: Subgrade and Engineered Fill Compaction and Moisture Content Requirements

MATERIALS	MINIMUM RELATIVE COMPACTION (%)	MINIMUM RELATIVE COMPACTION (%) - UPPER 12 INCHES OF FILL IN PAVEMENT AREAS	MINIMUM MOISTURE CONTENT (PERCENTAGE POINTS ABOVE OPTIMUM)
Engineered Fill (Low Expansive, PI≤12)	90	95	1
Engineered Fill (Expansive, PI>12)	90	95	3
Aggregate Base*	95	--	0

**As specified in Section 7.0*

4.5 SMALL DIAMETER PIPELINES AND UTILITIES

Small diameter pipelines (18 inches in diameter or less) and/or other small diameter underground utility conduits are anticipated for the Project. Trench widths will depend on a number of factors including pipe/conduit diameter and material, as well as the number of pipes or conduits laid in a single trench. We recommend that trench widths extend a minimum of 6 inches beyond each outer edge of the pipe/conduit (or outer edge of the outermost exterior pipes/conduits if multiple ones are laid in a single trench) to allow for hand compaction of bedding and shading.

Unless concrete bedding is required, bedding should consist of well-graded sand or a sand/gravel mixture (such as an aggregate base). Maximum grain size should be ½ inch and the bedding material should have less than 5 percent passing the No. 200 sieve. Uniformly graded material such as pea gravel should not be used as bedding material. Bedding for pipelines should have a minimum thickness of 6 inches beneath the pipe and 6 inches above the pipe. Bedding for conduits should have a minimum thickness of 4 inches beneath the conduits and 6 inches above the conduits. All bedding should be placed to achieve uniform contact with the pipes or conduits.

Utility and pipe trenches should be backfilled above the bedding or shading with material meeting the specifications for engineered fill (Section 4.3). Care should be taken not to damage the pipes/ conduits during backfill placement and compaction. Backfill and compact all trenches in areas sensitive to settlement of compacted soil in accordance with Section 4.4.

Care should be exercised where trenches are located beside foundation areas. Trenches constructed parallel to foundations should be located entirely above a plane extending down from the lower edge of the footing at an angle of 45 degrees.

The contractor is responsible for conducting trenching and shoring in accordance with CALOSHA requirements. Compaction of the pipe bedding or backfill by means of jetting or flooding should not be allowed.

5.0 GEOTECHNICAL CONSIDERATIONS – BELOW-GRADE HDPE PIPELINE(S)

We understand that the Chilled Water Plant may include 24-inch HDPE below-grade pipeline(s). Trenches should be constructed in accordance with the appropriate City of Morgan Hill Standard Trench details, Valley Water standard details and specifications, and recommendations provided in this report, as appropriate.

5.1 TRENCHING

Trenches for pipelines can be either open-cut excavations or vertical shored and/or braced excavations. The design and installation of shoring systems should be the responsibility of the contractor. We recommend that the minimum trench width is the outside diameter of the pipe (O.D.) plus 24 inches. The trench width should be taken as the clear distance between trench walls or the inside face-to-face distance between ground support systems. This trench width is intended to allow sufficient room for the compaction of the pipe zone backfill using hand-held equipment.

Where conditions allow, trenches having sloping sidewalls may be used to install the pipe. Where sloping side-wall trenches are excavated, the minimum trench width discussed above should apply at the pipe invert. The designer should specify the maximum trench width so that loading on the pipe does not exceed the load assumed in the design of the pipe.

5.2 PIPE BEDDING

Pipe bedding placed in trenches (prepared according to Section 4.2) should consist of a durable granular material such as a well-graded sand or sand/gravel mixture (such as an aggregate base). Maximum grain size should be ¾ inch and the bedding material should have less than 5 percent passing the No. 200 sieve. We anticipate that excavated on-site soil will not be suitable for use as pipe bedding. Uniformly graded material such as pea gravel should not be used as pipe bedding material.

Pipe bedding should be placed a minimum of 6 inches below the bottom of the pipeline to at least the spring line of the pipeline (i.e., a height of 0.5D from the bottom of pipe, where D is the outside diameter of the pipe). Pipe bedding should be moisture conditioned, placed, and mechanically compacted in accordance with Section 4.4.

5.3 PIPE ZONE BACKFILL

Material required for pipe zone backfill may vary depending on the type of pipe or corrosion protection systems. Depending on the corrosion protection system of the pipe, suitable pipe zone backfill material may consist of a well-graded sand or sand/gravel mixture.

Pipe manufacturers and suppliers should be consulted to establish pipe zone backfill material and compaction requirements for their pipelines. If the pipe manufacturers have no specific requirements, then pipe zone backfill should be placed in 6-inch (maximum) loose lifts and compacted in accordance with recommendations in Section 4.4. If the contractor demonstrates compaction can be achieved, lifts thicker than 6 inches can be used if allowed by the construction specifications. Trench width recommendations discussed in the previous section should help minimize potential damage. Pipe zone backfill should be placed evenly up each side of the pipe

to prevent displacement of the pipe during backfilling. Jetting or saturation as a means of compaction should not be allowed.

5.4 TRENCH ZONE BACKFILL

Trench zone backfill is the material placed in a pipeline trench from 12 inches above the top of the pipe to finished grade or, in paved areas, to the pavement section subgrade. Final backfill is the material placed within 18 inches of finished grade, or, if the trench is under a road, all material within 18 inches of subgrade. We recommend that the trench zone backfill consist of engineered fill as described in Section 4.3.

Trench zone backfill should be placed and compacted in accordance with the recommendations in Section 4.4. Flooding and/or jetting of trench or final backfill should not be permitted.

If native material is not used as trench zone backfill, acceptable material may be imported to the site. Commonly used backfill includes Class 2 Aggregate Base (Caltrans Standard Specifications, Section 26) and Class 2 Aggregate Subbase (Caltrans Standard Specifications, Section 25). The final backfill zone of the trench should be compatible with the surface features on either side of the trench.

6.0 FOUNDATION RECOMMENDATIONS

We developed foundation recommendations using data obtained from our field exploration, laboratory test results, and engineering analysis. We anticipate that the chiller plants and other associated pumps and equipment can be founded on a structural mat. Alternatively, the equipment for the chiller plants can be placed on a slab–on-grade supported by shallow footings. The boundary walls can be supported on shallow continuous footings. We should be given the opportunity to review structural plans to check for conformance with the recommendations provided herein.

6.1 FOUNDATION SETTLEMENT

No compressible soil or non-engineered fill underlies the Project site; therefore, static settlement of foundations will be largely immediate and will take place during construction. Provided our report recommendations are followed and given the proposed construction, we anticipate that less than 1 inch of immediate post-construction static settlement is possible at the Project site considering loads of 3,000 pounds per square feet (psf) for mat foundations and 2,500 psf for shallow footings. Structures should be designed to accommodate a differential settlement of up to ¼ inch between adjacent footings.

Given that the subsurface material at the Project site is primarily dense to very dense granular material, the seismic settlement from liquefaction and dynamic densification at the site is negligible.

6.2 CONVENTIONALLY REINFORCED STRUCTURAL MAT FOUNDATIONS

The chiller plants and associated equipment may be supported on a conventionally reinforced structural mat. The Structural Engineer should determine the required mat thickness based on the structural loading demands and using the geotechnical recommendations in this report. The minimum backfill height of soil against the mat at the perimeter should be 6 inches.

The appropriate allowable contact pressures beneath structural mat foundations will vary with their size, shape, and other factors including limiting total and differential settlements. We recommend the allowable net soil bearing pressure on the slab be limited to 3,000 psf for dead-plus-live loads. This value may be increased by one-third for the short-term effects of wind or seismic loading. The allowable bearing capacity recommended herein includes a factor of safety of at least 3.0 against bearing failure.

Structural mat foundations typically experience some deflection due to loads placed on the mat and the reaction of the subgrade underlying the mat. We recommended that a design modulus of vertical subgrade reaction (K_{V1}) of 200 pci be used for evaluating such deflections of structural mats bearing on competent soil (i.e. meeting the criteria for engineered fill). The horizontal modulus of subgrade reaction (K_H) is one-half the vertical modulus. K_{V1} is based on the load-deformation relationship of a one square foot area applied to the soil and should be adjusted for the design structural mat size. The modulus of subgrade reaction can be modified using the following equation:

$$K_B = K_{V1} \times \left(\frac{B+1}{2B}\right)^2$$

Where:
B = the width of least dimension of the mat.

Structural mats should be supported on a minimum 6-inch thick pad of compacted leveling course such as Class II aggregate base or other material meeting the criteria for engineered fill (Section 4.3). The leveling course should be compacted in accordance with Section 4.4.

6.3 SHALLOW FOOTINGS

The proposed boundary walls can be supported on shallow footings. In addition, the chiller plants and accessory mechanical and electrical equipment for the chillers can be supported on shallow continuous footings with an interior floor slab-on-grade. The minimum depth and width of the footings should be at least 24 inches and 18 inches, respectively. These values given are to be measured below the lowest adjacent pad grade.

Shallow footing foundations should be designed for a maximum allowable bearing pressure of 2,500 psf for dead-plus-live loads. Increase the bearing capacity by one-third for the short-term effects of wind or seismic loading. The allowable bearing capacity value presented here has a factor of safety of at least 3.0 against bearing failure.

The maximum allowable bearing capacity is a net value; the weight of the footing or mat may be neglected for design purposes. Footings located adjacent to utility trenches should have their bearing surfaces below an imaginary 1:1 (horizontal:vertical) plane projected upward from the bottom edge of the trench to the footing.

6.4 FOUNDATION LATERAL RESISTANCE

Lateral loads may be resisted by friction along the base and by passive resistance along the sides of mat foundations or shallow footings. We understand that no below grade structures are proposed for the Project. The passive resistance is based on an equivalent fluid pressure in pounds per cubic foot (pcf). We recommend the following allowable values for design:

- Passive Resistance: 300 pcf
- Coefficient of Friction: 0.4

The passive resistance includes a reduction factor of 1.5 to limit movement needed to mobilize passive pressures. The upper 1 foot of soil should be excluded from passive resistance computations unless it is confined by pavement or concrete slab.

6.5 SLAB MOISTURE VAPOR REDUCTION

The subgrade for the structural mats and slabs-on-grade should be uniform. The subgrade soil should be moisture conditioned to at least optimum moisture content before concrete placement, and the subgrade should not be allowed to dry prior to placement.

Structural mats and slabs-on-grade can have water vapor from beneath the slab migrate through the slab. If water vapor migrating through the slabs of the chiller plants would be undesirable, we recommend the following to reduce, but not stop, water vapor transmission upward through the slab-on-grade.

1. Install a vapor retarder membrane directly beneath the structural mat. Seal the vapor retarder at all seams and pipe penetrations. Vapor retarders should conform to Class A vapor retarder in accordance with ASTM E 1745-97 “Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs.”
   a. Slabs-on-grade should also be underlain by 4 inches of clean crushed rock. Crushed rock should have 100 percent passing the ¾-inch sieve and less than 5 percent passing the No. 4 Sieve.
   b. If the structural engineer specifies a layer of clean sand or pea gravel overlaying the vapor retarder under structural mats, then the mat foundation should have a thickened edge that is at least 12 inches wide to cutoff the flow of water between the bottom of the mat and the vapor retarding membrane. The edge should be thickened at least by the thickness of sand or gravel specified.
2. Use a concrete water-cement ratio for slabs-on-grade of no more than 0.50.
3. Provide inspection and testing during concrete placement to check that the proper concrete and water cement ratio are used.
4. Moist cure slabs for a minimum of 3 days or use other equivalent curing specified by the structural engineer.

7.0 PAVEMENT DESIGN

Using traffic indexes for various pavement loading requirements and an assumed R-value of 20, we developed the following preliminary pavement section recommendations using Topic 630 of the Caltrans Highway Design Manual, presented in Table 7.0-1.

TABLE 7.0-1: Preliminary Flexible Pavement Design

TRAFFIC INDEX (TI)	AC (INCHES)	AB (INCHES)
4	3	5
5	3	8

TRAFFIC INDEX (TI)	AC (INCHES)	AB (INCHES)
6	3½	10
7	4	12

Notes: AC is asphalt concrete
AB is aggregate base Class 2 Material with minimum R = 78

The Civil Engineer should determine the appropriate traffic indices based on the estimated traffic loads and frequencies. Aggregate base material should meet current Caltrans specifications for Class 2 aggregate base.

8.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical recommendations for design of the improvements discussed in Section 1.2 for the Coyote Creek Chilled Water Plant Project. If changes occur in the nature or design of the Project, we should be allowed to review this report and provide additional recommendations, if any. The conclusions and recommendations contained in this report are solely professional opinions based on the Project as described and are valid for a period of no more than two years from the date of report issuance.

We strived to perform our professional services according to generally accepted geotechnical engineering principles and practices currently employed in the area. There is no warranty, either express or implied.

This report is based primarily upon field explorations and laboratory data discovered at the time of report preparation. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional costs may be required to complete the Project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, we should be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include work to determine the existence of possible hazardous material. If any hazardous material is encountered during construction, then notify the proper regulatory officials immediately.

This document must not be subject to unauthorized reuse; that is, reusing without our written authorization. Such authorization is essential because it requires us to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

SELECTED REFERENCES

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FIGURES

FIGURE 1: Vicinity Map
FIGURE 2: Project Site Plan
FIGURE 3: Exploration Site Plan
FIGURE 4: Regional Geologic Map
FIGURE 5: Regional Faulting and Seismicity Map
FIGURE 6: Seismic Hazard Zones Map

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BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

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VICINITY MAP
SCVWD - COYOTE CREEK CHILLER
MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001	FIGURE NO. 1
SCALE: AS SHOWN	
DRAWN BY: LL	CHECKED BY: SB

ORIGINAL FIGURE PRINTED IN COLOR

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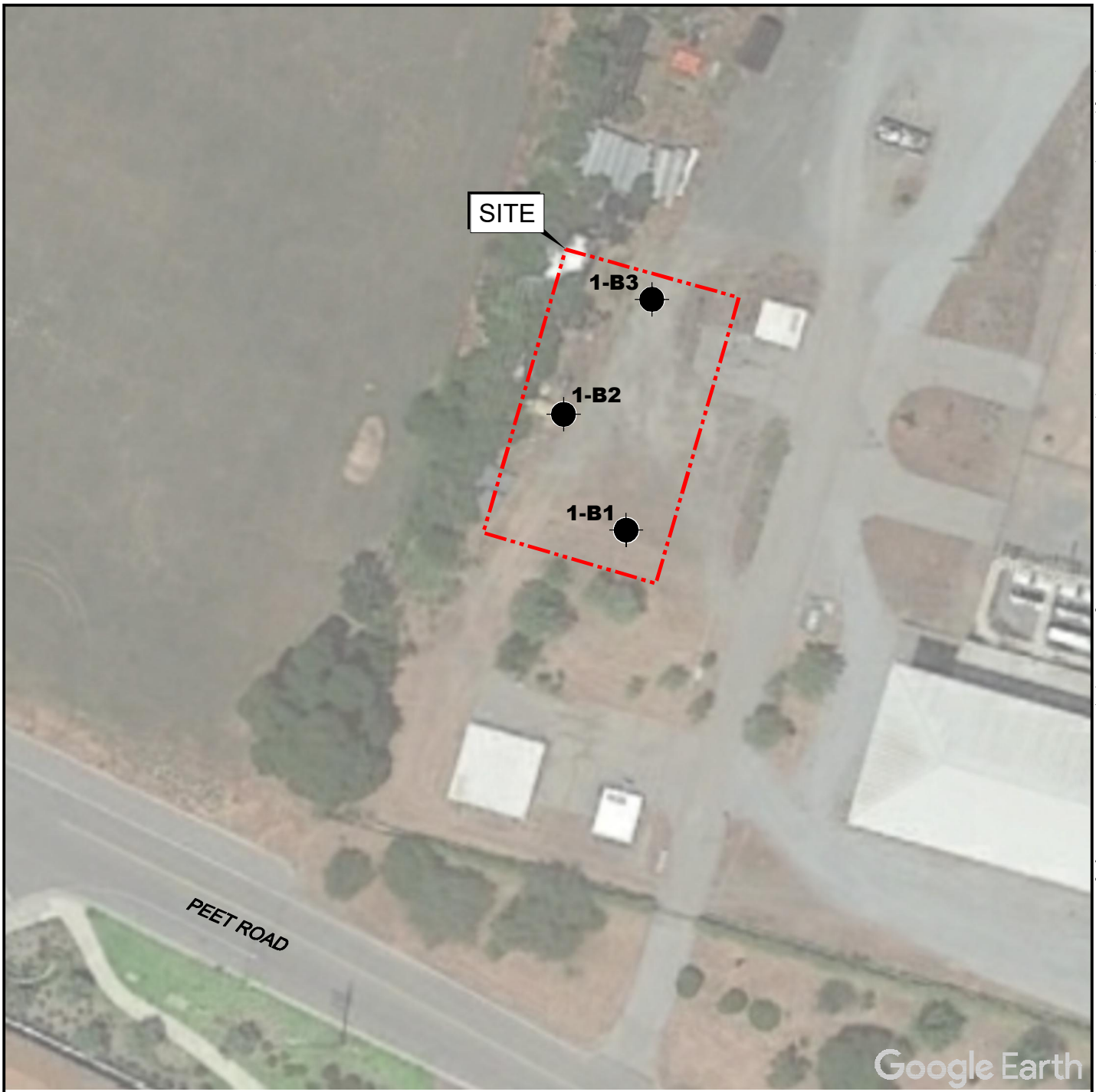

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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

1-B3 BORING (ENGEO 2021)

BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

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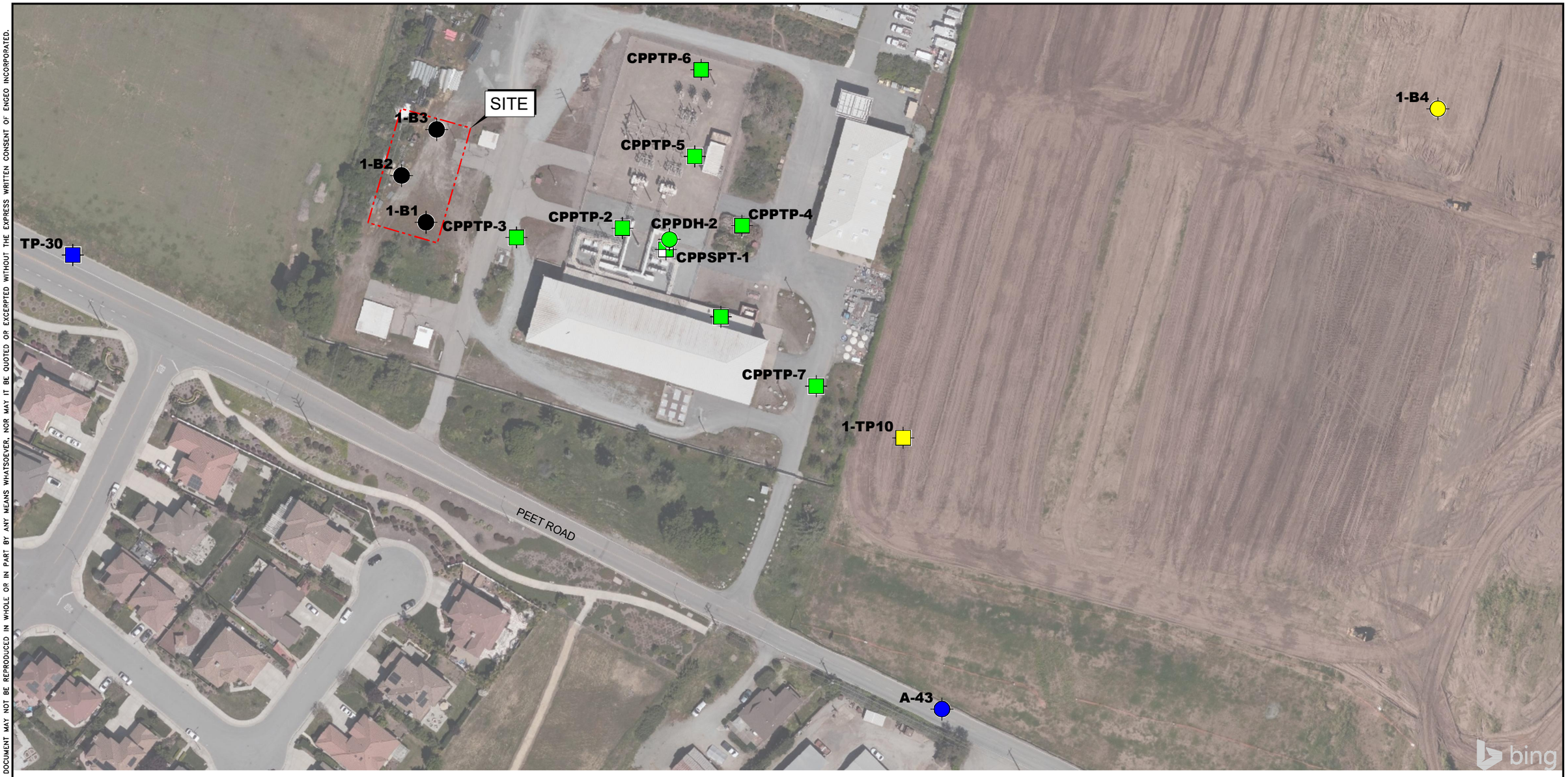
PROJECT SITE PLAN

SCVWD - COYOTE CREEK CHILLER

MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001		FIGURE NO. 2
SCALE: AS SHOWN		
DRAWN BY: LL	CHECKED BY: SB	

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- 1-B3 — BORING (ENGEO, 2021)
- 1-TP10 — TEST PIT (ENGEO, 2012)
- 1-B4 — BORING (ENGEO, 2012)
- A-43 — BORING (EARTH SCIENCES ASSOCIATES, 1979)
- TP-30 — TEST PIT (EARTH SCIENCES ASSOCIATES, 1979)
- CPPTP-7 — TEST PIT (USBR, 1983)
- CPPDH-2 — VERTICAL CORE HOLE (USBR, 1983)
- CPPSPT-1 — STANDARD PENETRATION TEST HOLE (USBR, 1983)

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BASE MAP SOURCE: BING MAPPING SERVICE

ENGEO Expect Excellence

EXPLORATION SITE PLAN
SCVWD - COYOTE CREEK CHILLER
MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001	FIGURE NO. 3
SCALE: AS SHOWN	
DRAWN BY: JV	CHECKED BY: NN

ORIGINAL FIGURE PRINTED IN COLOR

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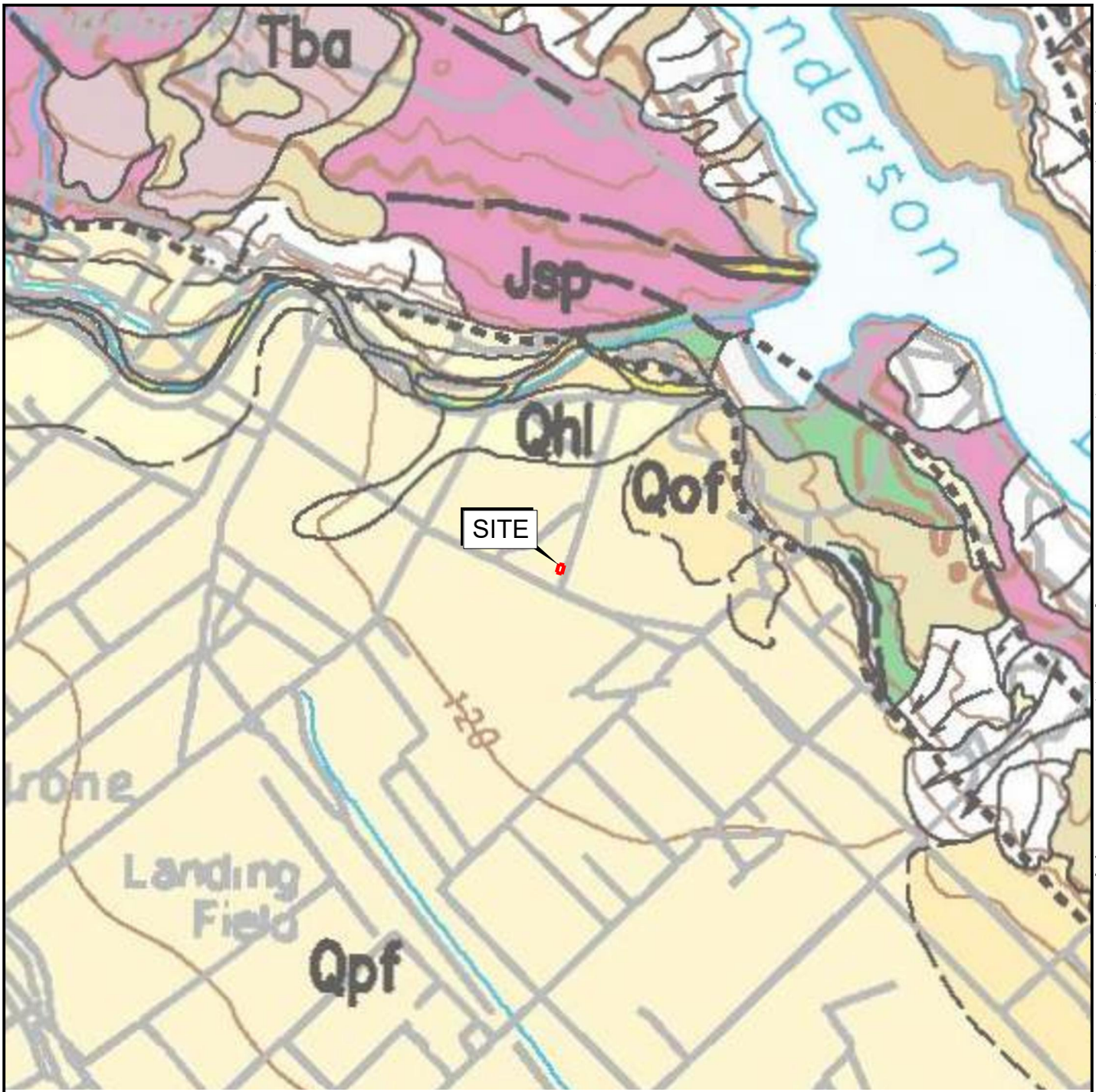

EXPLANATION

- Qhl LEVEE DEPOSITS (HOLOCENE)
- Qpf ALLUVIAL FAN DEPOSITS (UPPER PLEISTOCENE)
- Qof OLDER ALLUVIAL FAN DEPOSITS (MID TO UPPER PLEISTOCENE)
- Tba BASALT OF ANDRESON AND COYOTE RESERVIORS (PLIOCENE)
- Jsp SERPENTINIZED HARZBUGITE AND DUNITE

BASE MAP SOURCE: WENTWORTH, 1999

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REGIONAL GEOLOGIC MAP
SCVWD - COYOTE CREEK CHILLER
MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001		FIGURE NO. 4
SCALE: AS SHOWN		
DRAWN BY: LL	CHECKED BY: SB	

ORIGINAL FIGURE PRINTED IN COLOR

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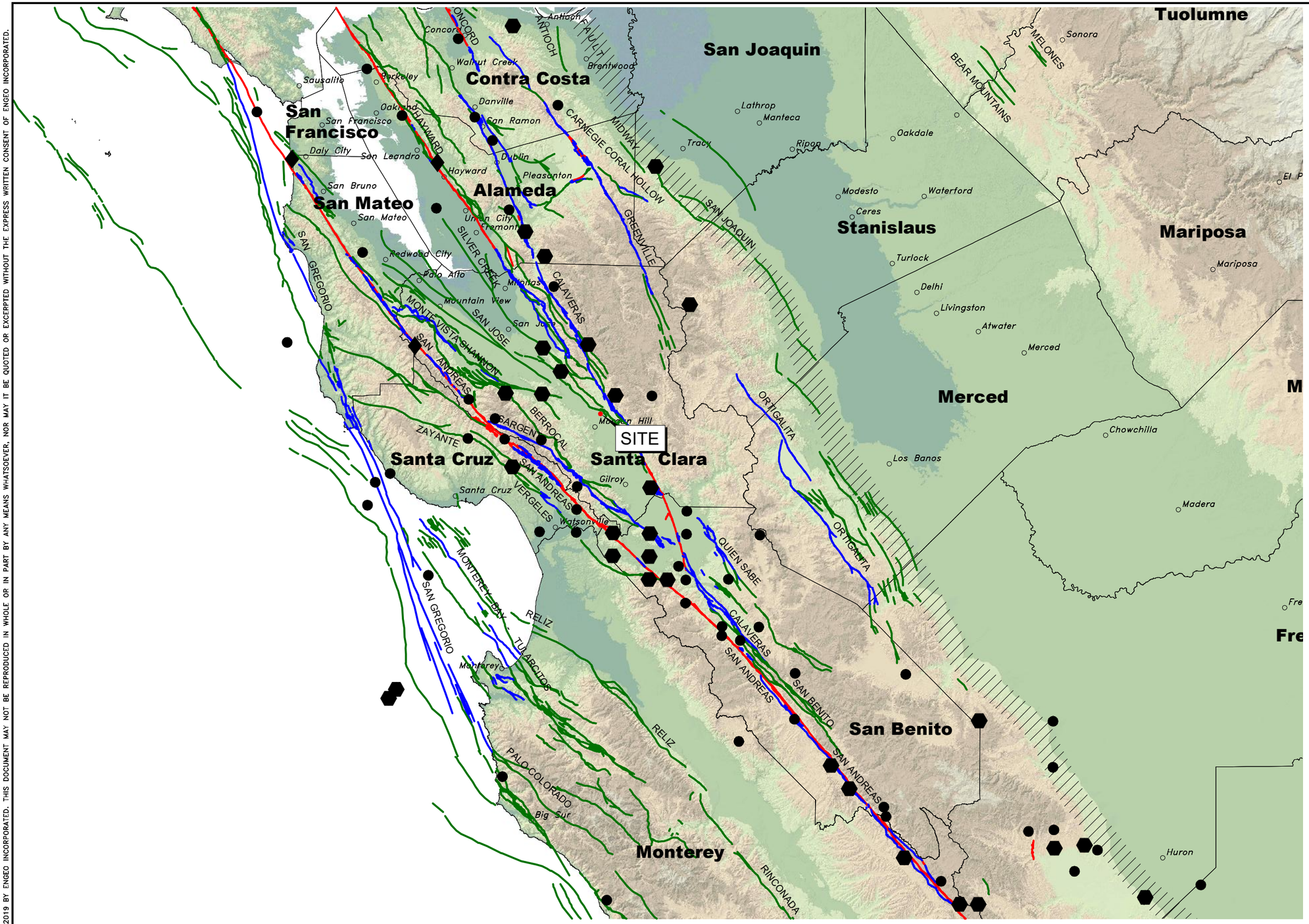

BASE MAP SOURCE:
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATASET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, NOVEMBER, 2010
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800–2000)

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REGIONAL FAULTING AND SEISMICITY

SCVWD - COYOTE CREEK CHILLER
MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001	FIGURE NO. 5
SCALE: AS SHOWN	
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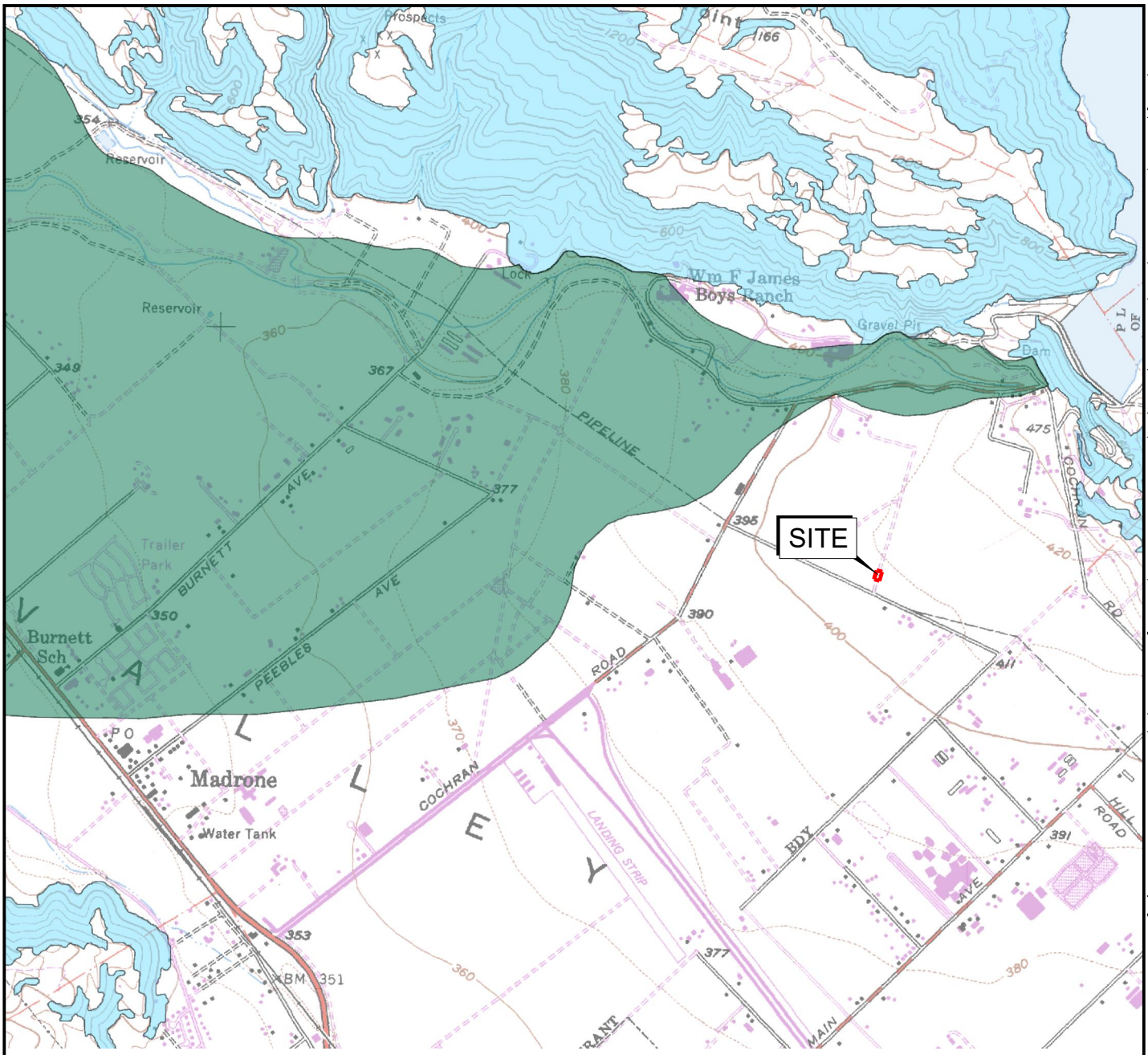

EXPLANATION

LIQUEFACTION

AREAS WHERE HISTORIC OCCURRENCE OF LIQUEFACTION, OR LOCAL GEOLOGICAL, GEOTECHNICAL AND GROUNDWATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

EARTHQUAKE-INDUCED LANDSLIDES

AREAS WHERE PREVIOUS OCCURRENCE OF LANDSLIDE MOVEMENT, OR LOCAL TOPOGRAPHIC, GEOLOGICAL, GEOTECHNICAL AND SUBSURFACE WATER CONDITIONS INDICATE A POTENTIAL FOR PERMANENT GROUND DISPLACEMENTS SUCH THAT MITIGATION AS DEFINED IN PUBLIC RESOURCES CODE SECTION 2693(c) WOULD BE REQUIRED

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BASE MAP SOURCE: CALIFORNIA DEPARTMENT OF CONSERVATION, CALIFORNIA GEOLOGICAL SURVEY, 2006

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SEISMIC HAZARD ZONES MAP
SCVWD - COYOTE CREEK CHILLER
MORGAN HILL, CALIFORNIA

PROJECT NO.: 18216.000.001		FIGURE NO. 6
SCALE: AS SHOWN		
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ORIGINAL FIGURE PRINTED IN COLOR

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APPENDIX A

BORING LOG KEY
BORING LOGS

KEY TO BORING LOGS

MAJOR TYPES			DESCRIPTION
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW - Well graded gravels or gravel-sand mixtures GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	GM - Silty gravels, gravel-sand and silt mixtures GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW - Well graded sands, or gravelly sand mixtures SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	SM - Silty sand, sand-silt mixtures SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		ML - Inorganic silt with low to medium plasticity CL - Inorganic clay with low to medium plasticity OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		MH - Elastic silt with high plasticity CH - Fat clay with high plasticity OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4 "	3"	12"	
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS AND GRAVELS	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

SILTS AND CLAYS	STRENGTH*
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

SAMPLER SYMBOLS

- Modified California (3" O.D.) sampler
- California (2.5" O.D.) sampler
- S.P.T. - Split spoon sampler
- Shelby Tube
- Dames and Moore Piston
- Continuous Core
- Bag Samples
- Grab Samples
- NR No Recovery

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

LINE TYPES

- ———— Solid - Layer Break
- – – – – – Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

- Groundwater level during drilling
- Stabilized groundwater level

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

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LOG OF BORING 1-B1

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LATITUDE: 37.157955 LONGITUDE: -121.638415

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 31½ ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 415 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CLAYEY SAND (SC), dark brown, moist, fine-grained sand, fine gravel, contains organics												
			SANDY LEAN CLAY (CL), dark brown, medium stiff, moist, fine-grained sand, fine gravel			27				54	12.1	121.4			
5	410		Reddish brown, very stiff, moist, medium-grained sand			15					12.6	120	2356		UU
			SANDY LEAN CLAY WITH GRAVEL (CL), yellowish brown mottled with gray, hard, moist, medium-grained sand			38	31	18	13	65	16.4	114.9		>4.5*	PP
10	405		Fine-grained sand			43								4.5*	PP
			CLAYEY GRAVEL WITH SAND (GC), reddish brown mottled with dark gray, dense, wet, fine- to coarse-grained sand, fine gravel			50				16					
			Very dense, coarse-grained sand, fine gravel			52									
20	395		Dark brown mottled with gray, fine- to medium-grained sand, fine gravel			73				14					
25	390														

LOG - GEOTECHNICAL_SU+QU W/ ELEV 18216 SCVWD CHILLER GINT.GPJ ENGEO INC.GDT 6/7/21

LOG OF BORING 1-B1

Expect Excellence

LATITUDE: 37.157955 LONGITUDE: -121.638415

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 31½ ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 415 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			Reddish brown, dense, less clay			50									
30	385		LEAN CLAY (CL), reddish brown mottled with gray, hard, moist			24								>4.5*	PP
			End of boring at approximately 31.5'. Groundwater not measured due to drilling method.												

ENGEO
Expect Excellence

LOG OF BORING 1-B2

LATITUDE: 37.158084 LONGITUDE: -121.638502

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 30 ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 414 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
0	414		CLAYEY SAND (SC), dark brown, moist, fine-grained sand, fine gravel, contains organics												
			Very loose, fine gravel			8									
	410		Mottled with black, medium dense			30				39	11	117			
5															
						29									
	405		WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), yellowish brown, medium dense, moist, fine- to coarse-grained sand, fine gravel												
10			Very dense			50/3"				6	6.5	113.1			
	400		CLAYEY GRAVEL WITH SAND (GC), dark reddish brown, very dense, wet, fine-grained sand, fine to coarse gravel			50/6"									
15															
			Fine-grained sand, fine to coarse gravel			50/4"				13					
	395														
20															
			Dense			47				14					
25	390														

LOG - GEOTECHNICAL_SU+QU W/ ELEV 18216 SCVWD CHILLER GINT.GPJ ENGEO INC.GDT 6/7/21

LOG OF BORING 1-B2

ENGEO Expect Excellence

LATITUDE: 37.158084 LONGITUDE: -121.638502

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 30 ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 414 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CLAYEY GRAVEL WITH SAND (GC), dark reddish brown, very dense, wet, fine-grained sand, fine to coarse gravel												
	385		LEAN CLAY (CL), light yellowish brown, medium stiff to stiff, moist			20								1*	PP
30			End of boring at approximately 30'. Groundwater not measured due to drilling method.												

LOG - GEOTECHNICAL_SU+QU W/ ELEV 18216 SCVWD CHILLER GINT.GPJ ENGEO INC.GDT 6/7/21

LOG OF BORING 1-B3

ENGEO Expect Excellence

LATITUDE: 37.158214 LONGITUDE: -121.638381

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 31½ ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 415 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			SILTY SAND WITH GRAVEL (SM), reddish brown, moist, fine- to medium-grained sand, fine gravel, contains organics												
			Loose			11					10.3	113			
5	410		SANDY LEAN CLAY WITH GRAVEL (CL), reddish brown, hard, moist, fine- to coarse-grained sand Mottled with gray			34	26	17	9	60	14.6	117.7	7138		UU
			WELL GRADED GRAVEL (GP), reddish yellow mottled with gray, dense, moist, fine- to coarse-grained sand, fine to coarse gravel			39									
			SILTY SAND (SM), dark brown, dense, moist, fine-grained sand												
10	405		WELL GRADED SAND WITH CLAY AND GRAVEL (SW-SC), dark brown mottled with gray, dense, fine- to coarse-grained sand, fine gravel			49				7					
			CLAYEY GRAVEL WITH SAND (GC), grayish brown, dense, wet, fine- to coarse-grained sand, fine to coarse gravel			42				14					
15	400		Medium dense, fine to coarse gravel			28									
			Very dense			74									
20	395														
25	390														

LOG - GEOTECHNICAL_SU+QU W/ ELEV 18216 SCVWD CHILLER GINT.GPJ ENGEO INC.GDT 6/7/21

LOG OF BORING 1-B3

Expect Excellence

LATITUDE: 37.158214 LONGITUDE: -121.638381

Geotechnical Exploration
Coyote Creek Chilled Water Plant
Morgan Hill, CA
18216.000.001

DATE DRILLED: 2/3/2021
HOLE DEPTH: Approx. 31½ ft.
HOLE DIAMETER: 4.5 in.
SURF ELEV (WGS84): Approx. 415 ft.

LOGGED / REVIEWED BY: A. Noroozi / SB
DRILLING CONTRACTOR: Britton Exploration
DRILLING METHOD: Mud Rotary
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
			CLAYEY SAND WITH GRAVEL (SC), reddish brown mottled with black, very dense, wet, medium- to coarse-grained sand, coarse gravel			67				21					
30	385		LEAN CLAY WITH GRAVEL (CL), reddish brown, stiff, moist, fine-grained sand			19								1.5*	PP
			End of boring at approximately 31.5'. Groundwater not measured due to drilling method.												

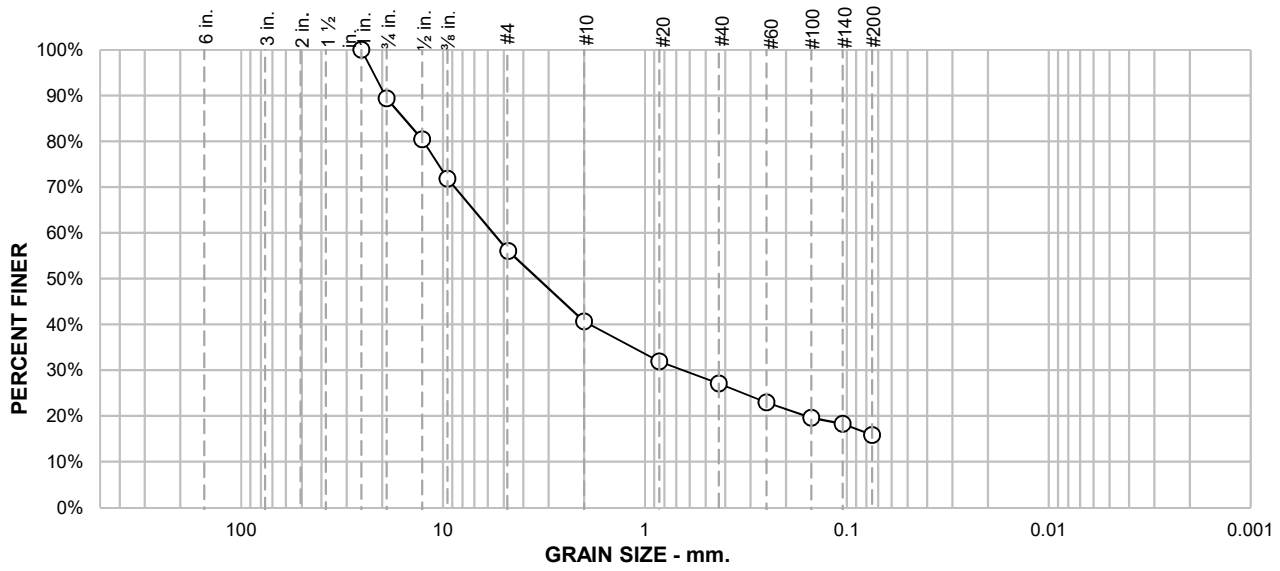
LOG - GEOTECHNICAL_SU+QU W/ ELEV 18216 SCVWD CHILLER GINT.GPJ ENGEO INC.GDT 6/7/21

APPENDIX B

LABORATORY RESULTS

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D6913, Method A



SAMPLE ID: 1-B1@14

DEPTH (ft): 14

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
	11	33	15	14	11	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100		
¾ in.	89		
½ in.	80		
⅜ in.	72		
#4	56		
#10	41		
#20	32		
#40	27		
#60	23		
#100	20		
#140	18		
#200	16		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = 19.5548 mm D_{85} = 15.9086 mm D_{60} = 5.6524 mm

D_{50} = 3.3607 mm D_{30} = 0.6472 mm D_{15} =

D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants

PROJECT NAME: SCVWD - Coyote Creek Chiller

PROJECT NO: 18216.000.001 PH001

PROJECT LOCATION: Morgan Hill, CA

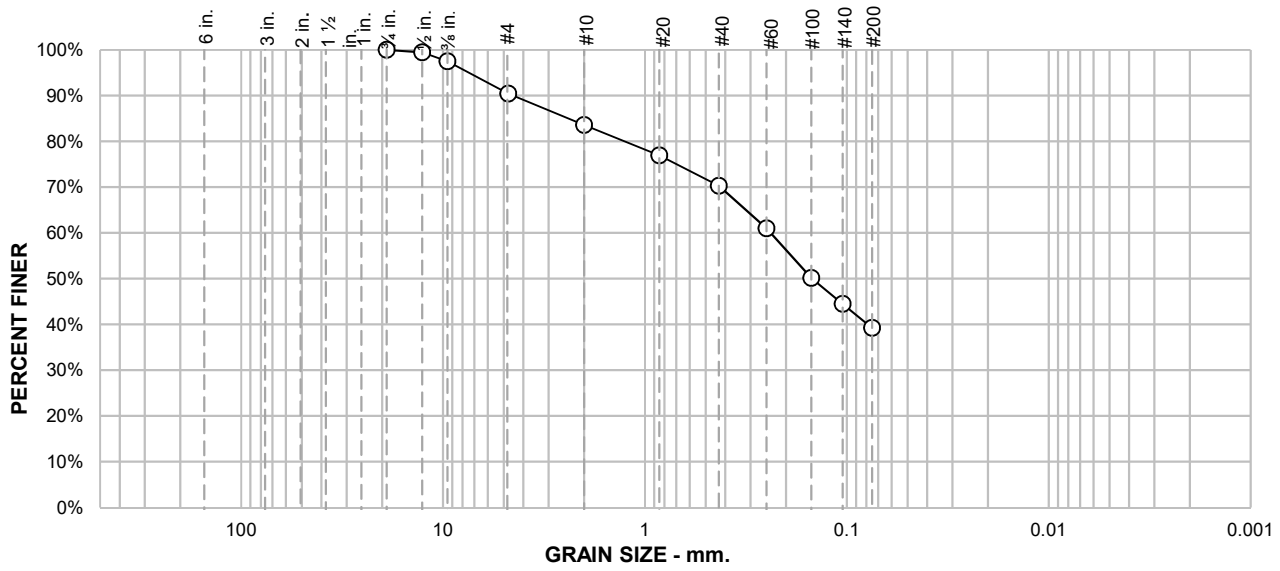
REPORT DATE: 2/18/2021

TESTED BY: V. Navarro

REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D6913, Method A



SAMPLE ID: 1-B2@5.5-6

DEPTH (ft): 5.5-6

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
		10	7	13	31	39	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
¾ in.	100		
½ in.	99		
⅜ in.	98		
#4	90		
#10	84		
#20	77		
#40	70		
#60	61		
#100	50		
#140	44		
#200	39		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = 4.7500 mm D_{85} = 2.3102 mm D_{60} = 0.2387 mm

D_{50} = 0.1500 mm D_{30} = D_{15} =

D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

* (no specification provided)

ENGEO Expect Excellence

CLIENT: Kennedy Jenks Consultants

PROJECT NAME: SCVWD - Coyote Creek Chiller

PROJECT NO: 18216.000.001 PH001

PROJECT LOCATION: Morgan Hill, CA

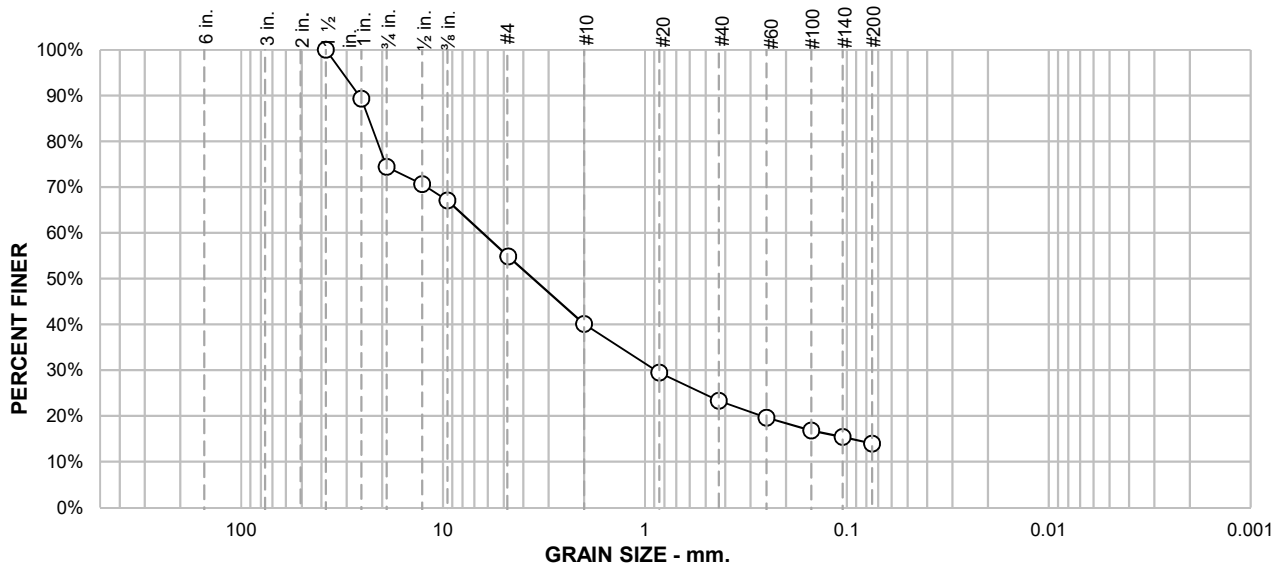
REPORT DATE: 2/18/2021

TESTED BY: V. Navarro

REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D6913, Method A



SAMPLE ID: 1-B3@13.5

DEPTH (ft): 13.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
	26	20	15	17	9	14	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1-½ in.	100		
1 in.	89		
¾ in.	74		
½ in.	71		
⅜ in.	67		
#4	55		
#10	40		
#20	29		
#40	23		
#60	20		
#100	17		
#140	15		
#200	14		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = 26.3537 mm D_{85} = 23.5243 mm D_{60} = 6.3474 mm

D_{50} = 3.5602 mm D_{30} = 0.9188 mm D_{15} = 0.1050 mm

D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants

PROJECT NAME: SCVWD - Coyote Creek Chiller

PROJECT NO: 18216.000.001 PH001

PROJECT LOCATION: Morgan Hill, CA

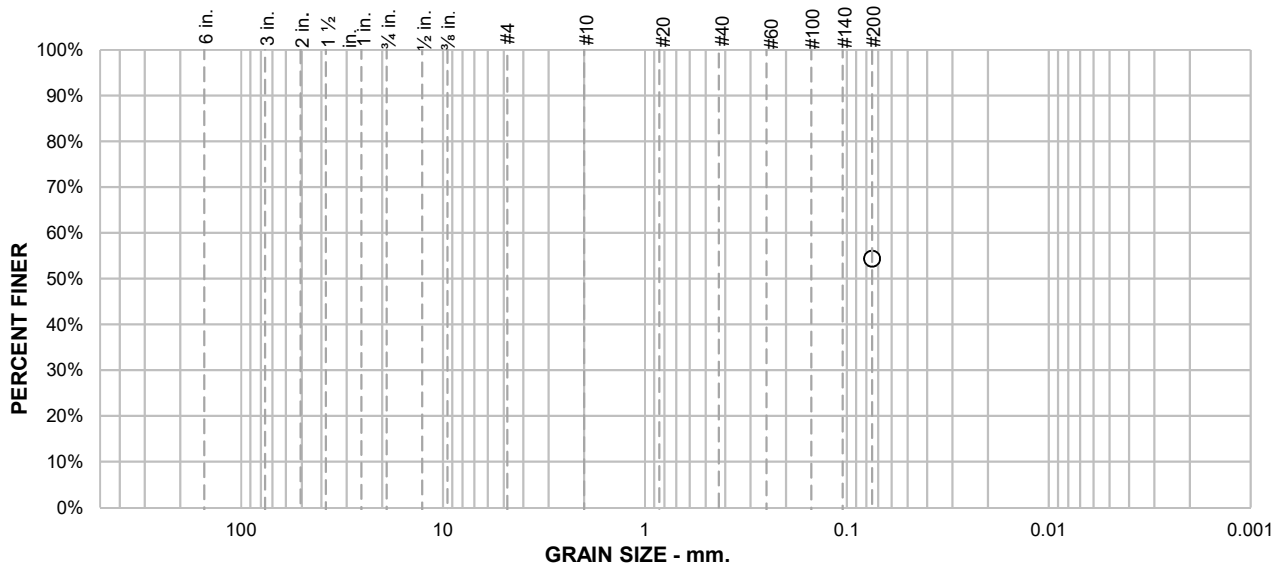
REPORT DATE: 2/18/2021

TESTED BY: V. Navarro

REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B1@3.5-4

DEPTH (ft): 3.5-4

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						54.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	54.3		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 180 min
Dry sample weight = 637.51 g

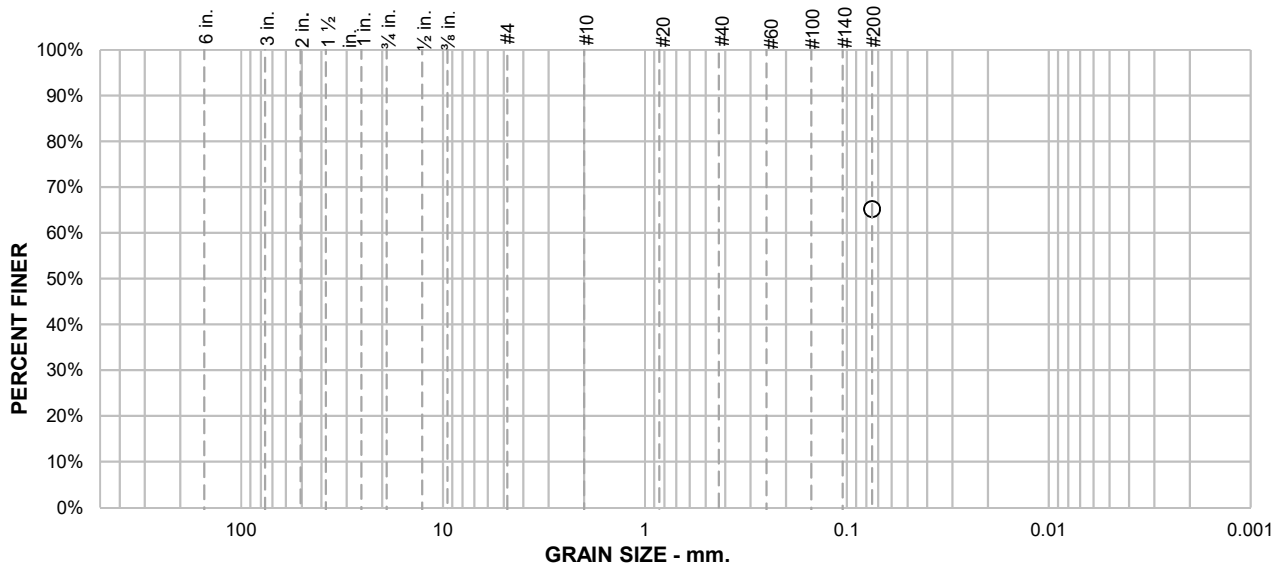
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B1@8.5-9

DEPTH (ft): 8.5-9

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						65.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	65.2		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = 18 LL = 31 PI = 13

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS = CL

REMARKS

PI: ASTM D4318, Wet Method

Soak time = 190 min
Dry sample weight = 463.41 g

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants

PROJECT NAME: SCVWD - Coyote Creek Chiller

PROJECT NO: 18216.000.001 PH001

PROJECT LOCATION: Morgan Hill, CA

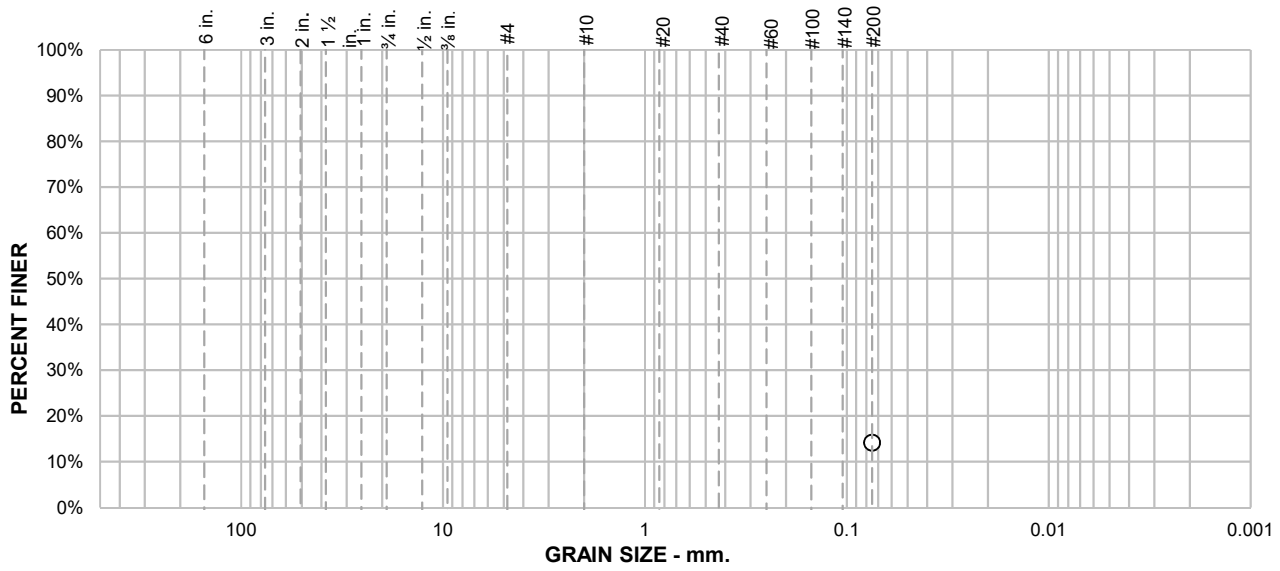
REPORT DATE: 2/18/2021

TESTED BY: V. Navarro

REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B1@22.5

DEPTH (ft): 22.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						14.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	14.1		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 200 min
Dry sample weight = 642.8 g

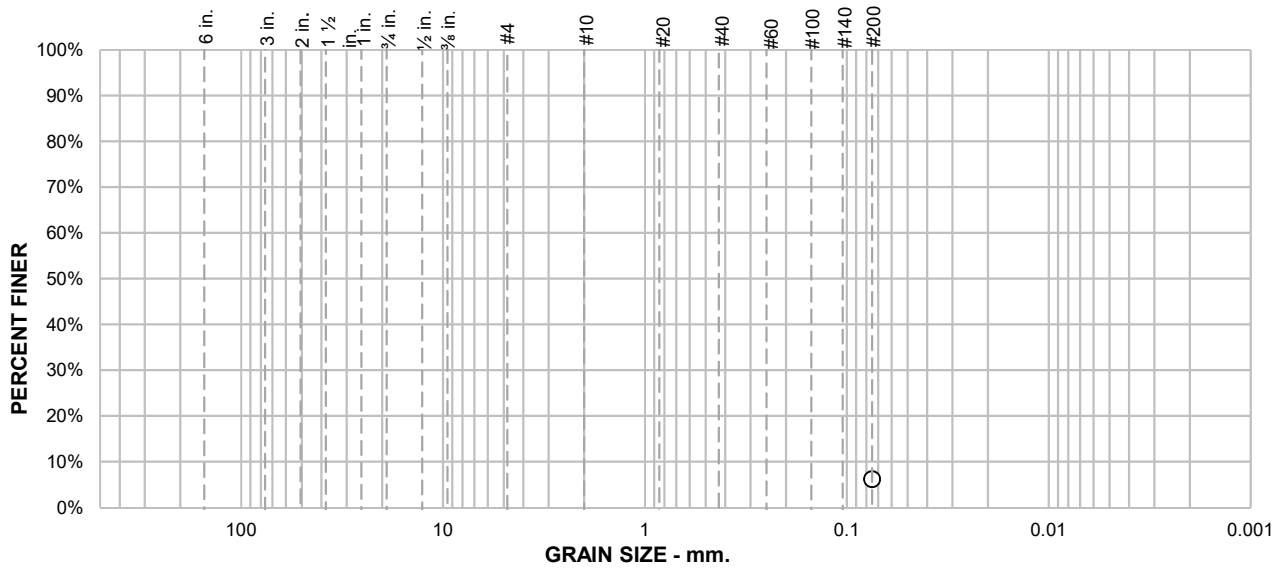
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B2@10-10.5

DEPTH (ft): 10-10.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	6.2		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 210 min
Dry sample weight = 725.2 g

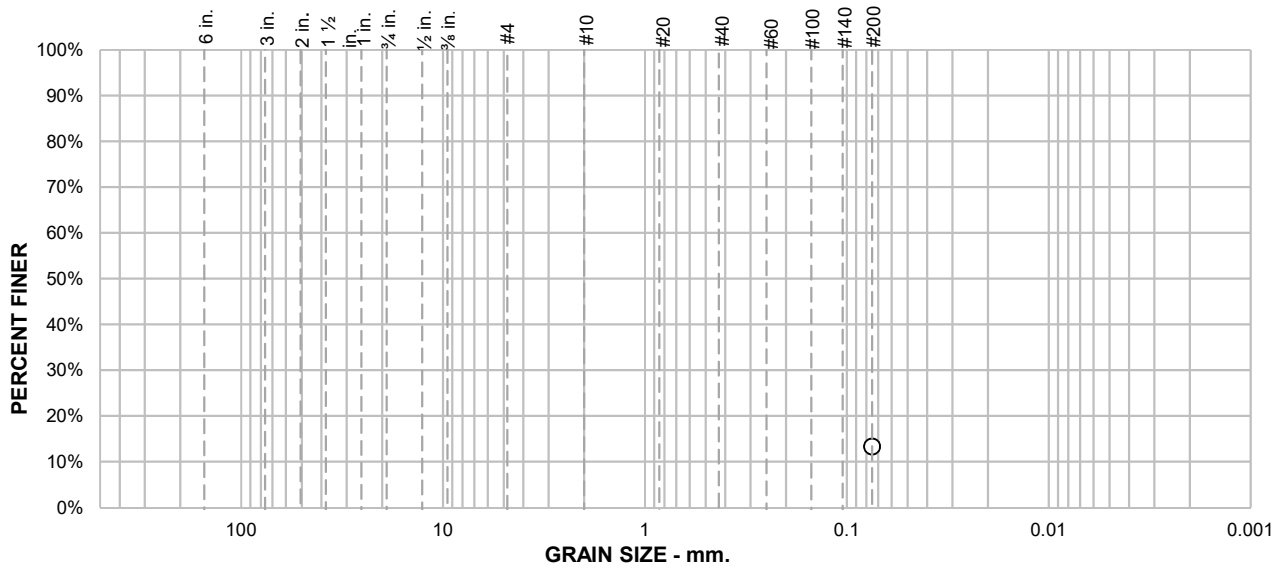
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B2@17.5

DEPTH (ft): 17.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						13.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	13.3		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 220 min
Dry sample weight = 356.8 g

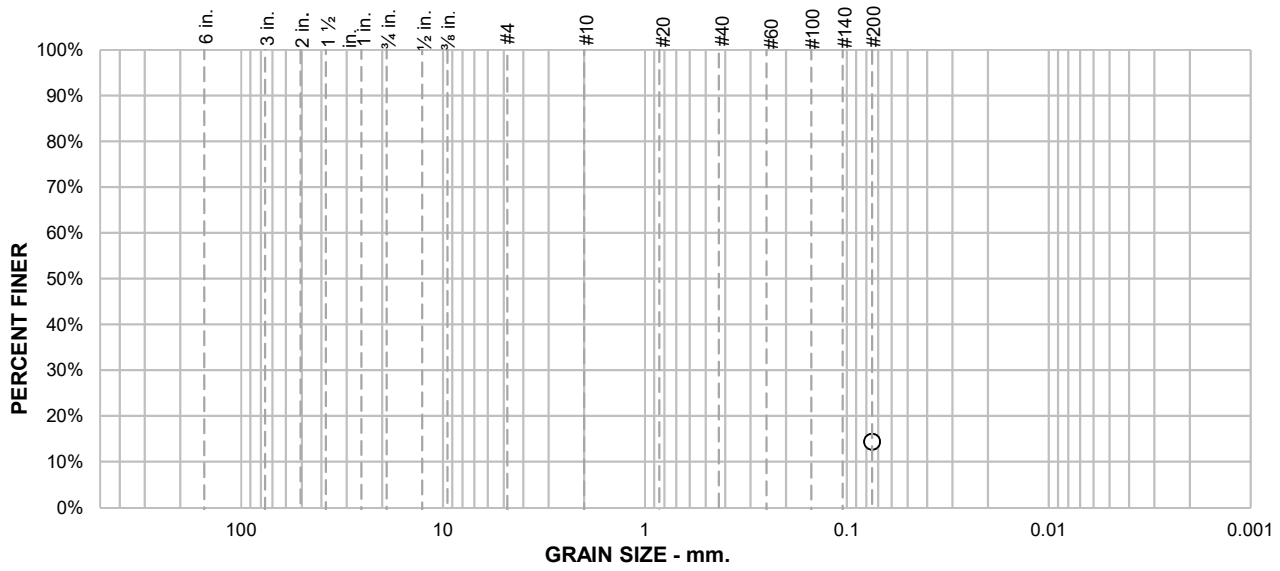
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B2@23.5

DEPTH (ft): 23.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						14.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	14.3		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 230 min
Dry sample weight = 407.2 g

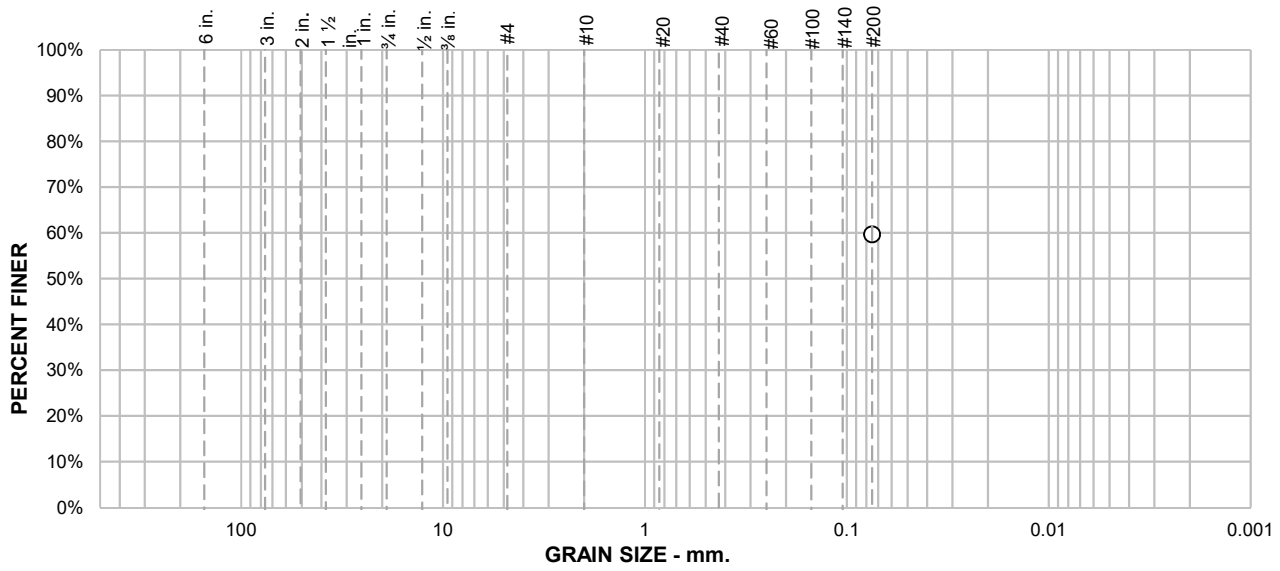
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B3@5.5-6

DEPTH (ft): 5.5-6

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						59.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	59.6		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = 17 LL = 26 PI = 9

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS = CL

REMARKS

PI: ASTM D4318, Wet Method

Soak time = 240 min
Dry sample weight = 505.8 g

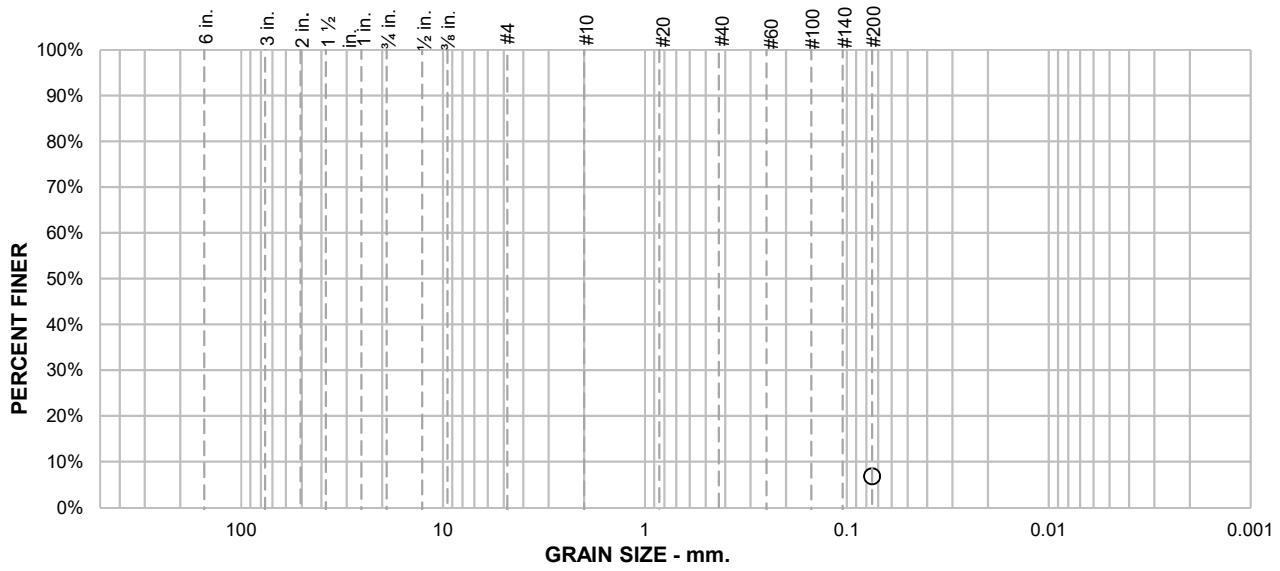
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B3@11-11.5

DEPTH (ft): 11-11.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						6.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	6.8		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 250 min
Dry sample weight = 790.5 g

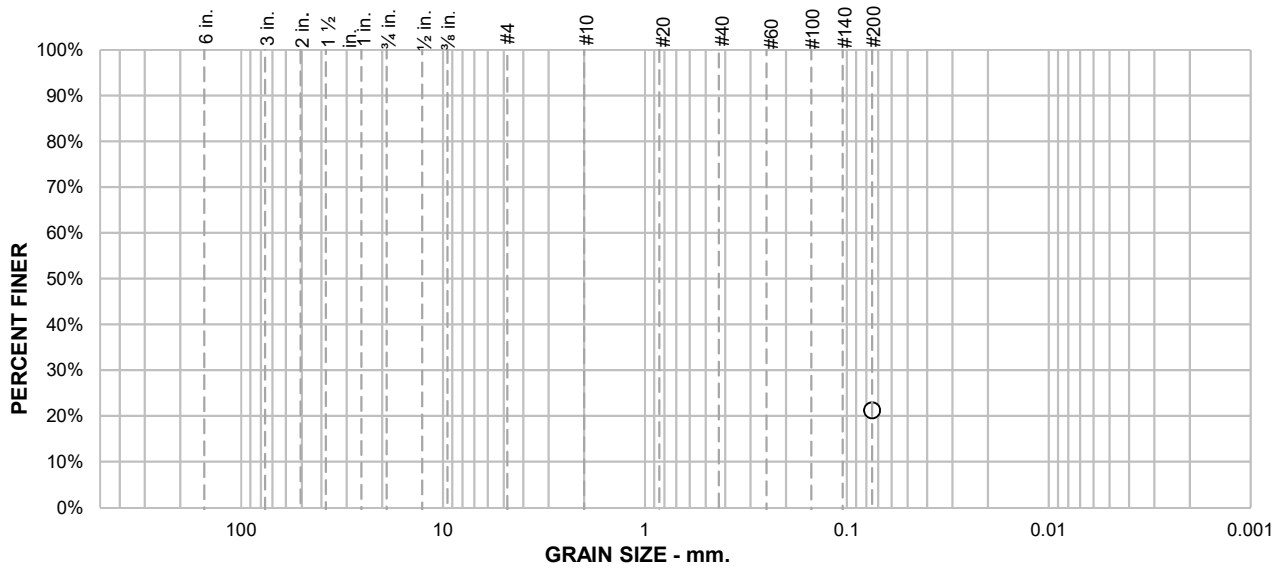
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: 1-B3@25.5

DEPTH (ft): 25.5

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						21.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	21.2		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 260 min
Dry sample weight = 389.1 g

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

MOISTURE-DENSITY DETERMINATION REPORT
ASTM D7263

SAMPLE ID	1-B1	1-B1	1-B2	1-B2	1-B3			
DEPTH (ft.)	3.5-4	8-9	5.5-6	10-10.5	3.5-4			
METHOD A OR B	B	B	B	B	B			
MOISTURE CONTENT (%)	12.1	16.4	11.0	6.5	10.3			
DRY DENSITY (pcf)	121.4	114.9	117.0	113.1	113.0			

SAMPLE ID								
DEPTH (ft.)								
METHOD A OR B								
MOISTURE CONTENT (%)								
DRY DENSITY (pcf)								

SAMPLE ID								
DEPTH (ft.)								
METHOD A OR B								
MOISTURE CONTENT (%)								
DRY DENSITY (pcf)								

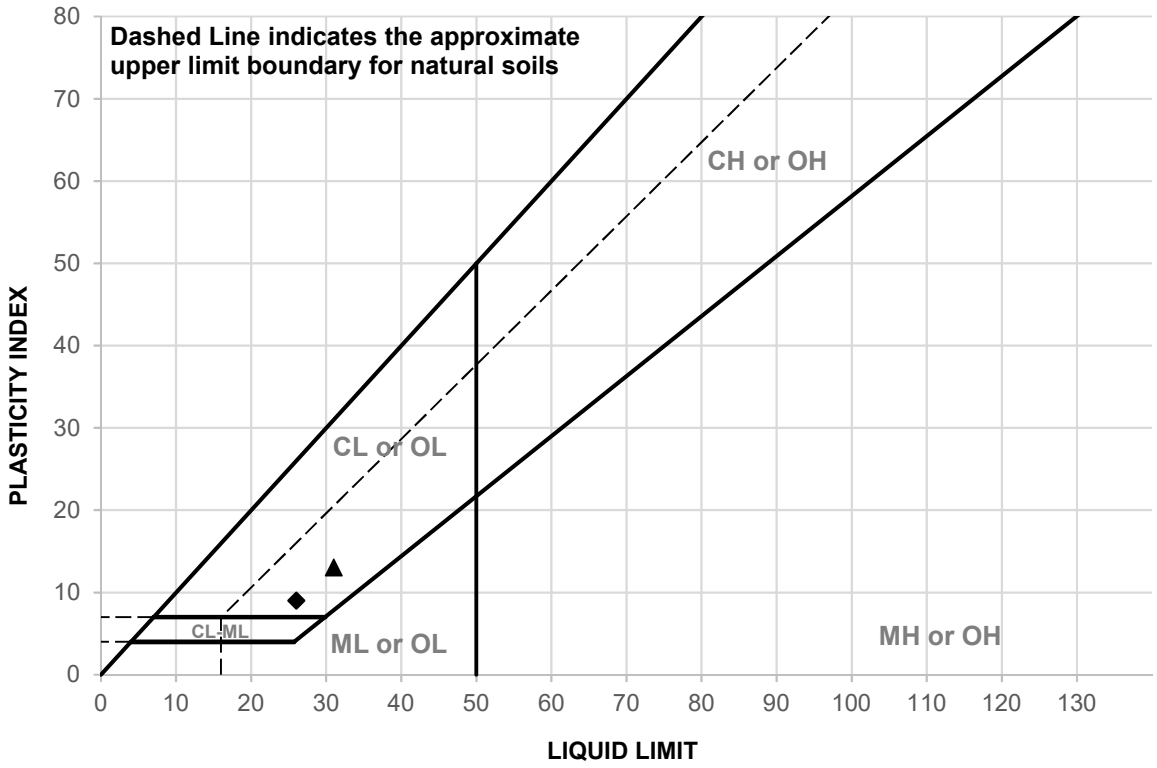
SAMPLE ID								
DEPTH (ft.)								
METHOD A OR B								
MOISTURE CONTENT (%)								
DRY DENSITY (pcf)								

SAMPLE ID								
DEPTH (ft.)								
METHOD A OR B								
MOISTURE CONTENT (%)								
DRY DENSITY (pcf)								

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

LIQUID AND PLASTIC LIMITS TEST REPORT
ASTM D4318



	SAMPLE ID	DEPTH	MATERIAL DESCRIPTION	LL	PL	PI
▲	1-B1@8.5-9	8.5-9 feet	See exploration logs	31	18	13
◆	1-B3@5.5-6	5.5-6 feet	See exploration logs	26	17	9

	SAMPLE ID	TEST METHOD	REMARKS
▲	1-B1@8.5-9	PI: ASTM D4318, Wet Method	
◆	1-B3@5.5-6	PI: ASTM D4318, Wet Method	

ENGEO
Expect Excellence

CLIENT: Kennedy Jenks Consultants
PROJECT NAME: SCVWD - Coyote Creek Chiller
PROJECT NO: 18216.000.001 PH001
PROJECT LOCATION: Morgan Hill, CA
REPORT DATE: 2/18/2021
TESTED BY: V. Navarro
REVIEWED BY: K. Lecce

Isotropic Unconsolidated Undrained Triaxial Test

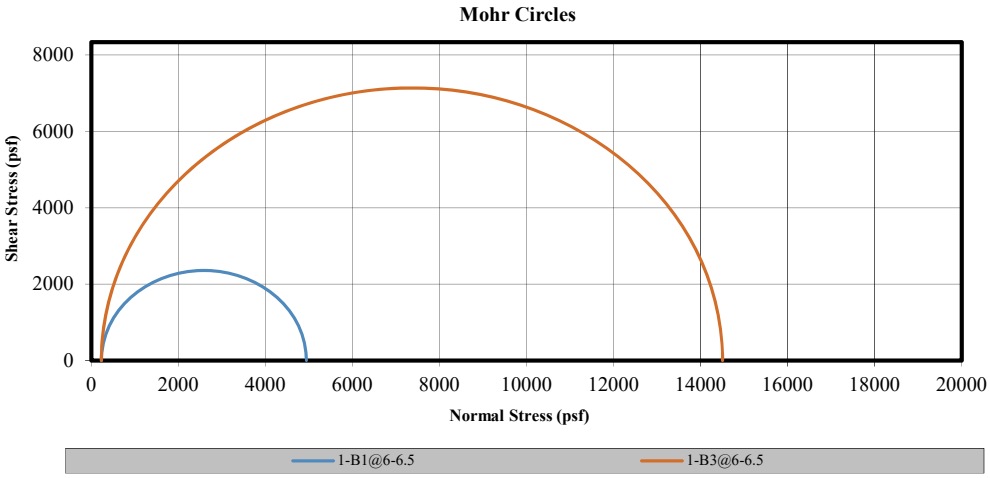
ASTM D2850

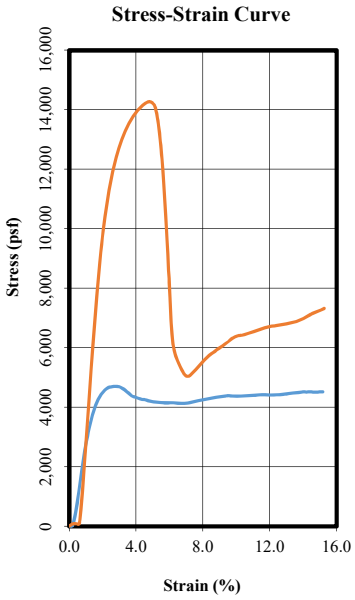
Date: 02/18/21

Checked By: K. Lecce

Date: 2/18/2021

Tested By: V. Navarro





Before Test	Specimen 1-B1@6-6.5	1-B3@6-6.5		
Water Content (%)	12.64	14.63		
Dry Density (pcf)	120.00	117.70		
Saturation (%)	82.78	89.85		
Void Ratio	0.42	0.44		
Diameter (in)	2.398	2.424		
Height (in)	5.074	5.048		
Height-to-Diameter Ratio	2.116	2.083		
ASTM D4318 - Wet Method				
Liquid Limit				
Plastic Limit				
ASTM D854 - Measured				
Specific Gravity	2.720	2.720		
After Test	**1-B1@6-6.5**	**1-B3@6-6.5**		
Water Content (%)	12.64	14.63		
Saturation (%)	82.78	89.85		
Strain Rate (in/min)	0.05	0.05		
Peak Deviator Stress (psf)	4711.2	14274.9		
Axial Strain @ Failure (%)	2.759	4.755		
	Cell Pressure			
Cell (psf)	230.0	230.4		
Back (psf)	n/a	n/a		
	Principle Stresses at Failure			
σ1 (psf)	4941.2	14505.3		
σ3 (psf)	230.0	230.4		
Corrected Peak Deviator Stress				

Mohr-Coulomb Parameters with a Non-zero Friction Angle (Ø≠0)			Cohesion at Failure with a Zero Friction Angle (Ø=0)			
Cohesion, c (psf)	n/a		2355.6	7137.5		
Friction Angle Ø	n/a		n/a	n/a		

Project Information	
Project Name:	SCVWD - Coyote Creek Chiller
Project Number:	18216.000.001 PH001
Project Location:	Morgan Hill, CA
Client:	Kennedy Jenks Consultants
Description:	See exploration logs
Test Remarks:	

ENGEO Expect Excellence

Isotropic Unconsolidated Undrained Triaxial Test

ASTM D2850

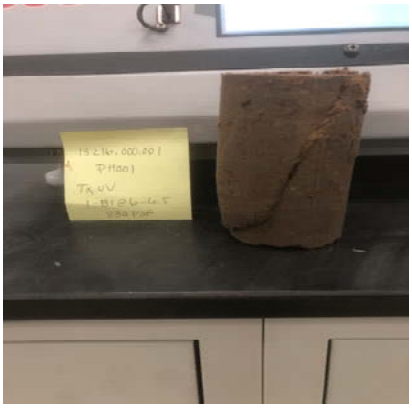
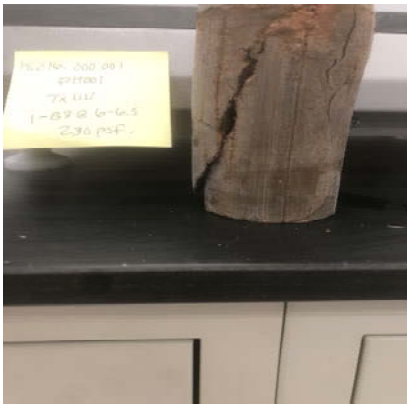
Date: 02/18/21

Checked By: K. Lecce

Date: 2/18/2021

Tested By: V. Navarro

SPECIMEN PHOTOS

SAMPLE NUMBER: 1-B1@6-6.5	SAMPLE NUMBER: 1-B3@6-6.5
	
SAMPLE NUMBER:	**SAMPLE NUMBER:**

Project Information	
Project Name:	SCVWD - Coyote Creek Chiller
Project Number:	18216.000.001 PH001
Project Location:	Morgan Hill, CA
Client:	Kennedy Jenks Consultants
Description:	See exploration logs
Test Remarks:	

ENGEO Expect Excellence

APPENDIX C

SUNLAND ANALYTICAL RESULTS

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 02/12/2021
Date Submitted 02/09/2021

To: Seema Barua
Engeo, INC
6399 San Ignacio Ave. Ste 150
San Jose, CA 95119

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 18216.000.001 Site ID : 1-B2 @2.5.
Thank you for your business.

* For future reference to this analysis please use SUN # 83996-175115.

EVALUATION FOR SOIL CORROSION

Soil pH	6.51		
Moisture	10.8 %		
Minimum Resistivity	2.68 ohm-cm (x1000)		
Chloride	4.7 ppm	00.00047	%
Sulfate	18.1 ppm	00.00181	%
Redox Potential	(+) 240 mv		
Sulfides	Presence - NEGATIVE		

METHODS
pH ASTM G-51(@ sat), Min.Resistivity ASTM G187 Mod.(Sm.Cell)
Sulfate ASTM D516 Mod., Chloride ASTM D512 Mod.
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 02/12/2021
Date Submitted 02/09/2021

To: Seema Barua
Engeo, INC
6399 San Ignacio Ave. Ste 150
San Jose, CA 95119

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 18216.000.001 Site ID : 1-B2 @ 3.0.
Thank you for your business.

* For future reference to this analysis please use SUN # 83996-175116.

EVALUATION FOR SOIL CORROSION

Soil pH	6.33	
Moisture	10.7 %	
Minimum Resistivity	3.48 ohm-cm (x1000)	
Chloride	3.8 ppm	00.00038 %
Sulfate	10.2 ppm	00.00102 %
Redox Potential	(+) 246 mv	
Sulfides	Presence - NEGATIVE	

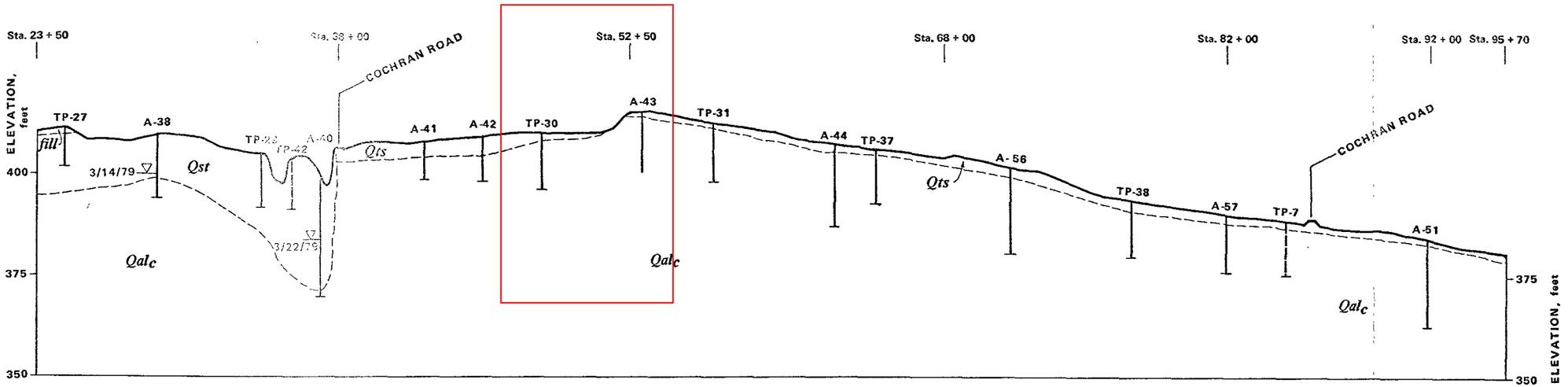
METHODS
pH ASTM G-51(@ sat), Min.Resistivity ASTM G187 Mod.(Sm.Cell)
Sulfate ASTM D516 Mod., Chloride ASTM D512 Mod.
Redox Potential ASTM G-200, Sulfides AWWA C105/A25.5

APPENDIX D

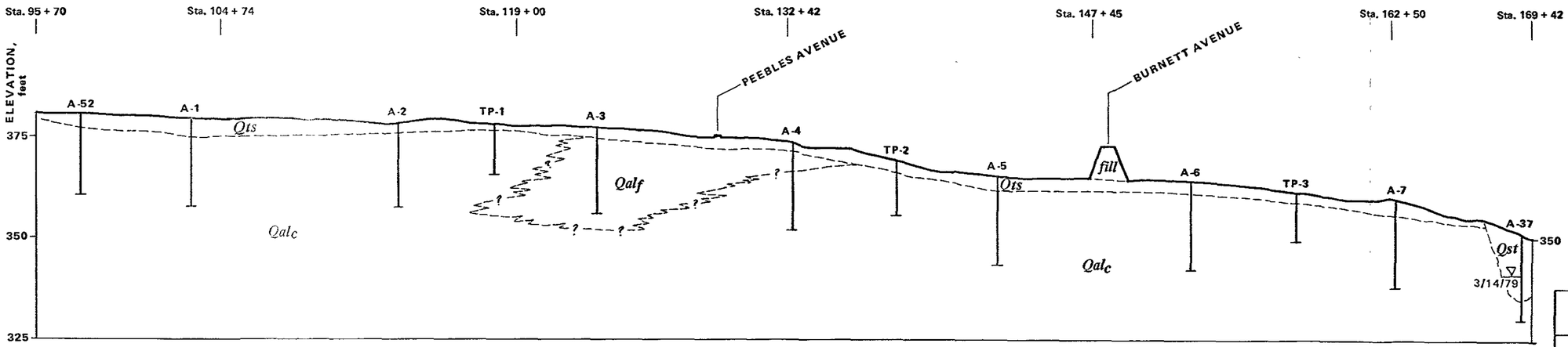
HISTORIC EXPLORATION LOGS

CROSS VALLEY PIPELINE AND ANDERSON DISTRIBUTARY
(Earth Sciences Associates, 1979)

SEGMENT 1
ANDERSON DAM TO FREEWAY ALIGNMENT



SEGMENT 2
FREEWAY ALIGNMENT



NOTES:

1. For location of sections see Figure No. 5.
2. For explanation of units and symbols, see Figure No. 6A.

SCALE:
1" = 500' HORIZONTAL
1" = 25' VERTICAL

Earth Sciences Associates
Palo Alto, California

CROSS VALLEY PIPELINE
GEOLOGIC LONGITUDINAL SECTIONS
ANDERSON DAM TO FREEWAY ALIGNMENT

Checked by T.D.Hunt	Date 6-22-79	Project No. 2013	Figure No. 6
Approved by	Date 6-22-79		

Qal$_C$

Approximate Location for Proposed 54" Dia.

Approximate Location for Proposed 48" Dia.

TP-30

A-41

A-42

STA. 38+00 MATCH LINE SEE SHEET 1

STA. 52+50 MATCH LINE SEE SHEET 3

Qal$_C$

Qal$_C$

A-41

A-42

TP-30

Existing Ground @ Pipe ℄

Profile Grade - Top of Proposed Pipe

SM

ML

GM

SM

GC

GM

STA. 38+00 MATCH LINE SEE SHEET 1

STA. 52+50 MATCH LINE SEE SHEET 3

ELEVATION IN FEET

415

410

405

400

395

ORIGINAL

PROFILE SCALES

HORIZ: 1" = 50'

VERT: 1" = 5'

STATION 38 39 40 41 42 43 44 45 46 47 48 49 50

DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

PHOTOGRAPHY BY AIR-PHOTO CO. INC. DATE: 3-20-79 RECTIFICATION BY: AIR-PHOTO CO., INC.

DATE

DESIGN

DRAWN

CHECKED

Santa Clara Valley Water District

ENGINEERING CERTIFICATION

PROJECT ENGINEER R.C.E. NO. 22949

ENGINEERING APPROVAL

DIVISION ENGINEER R.C.E. NO. 14455

Earth Sciences Associates

Palo Alto, California

CROSS VALLEY PIPELINE

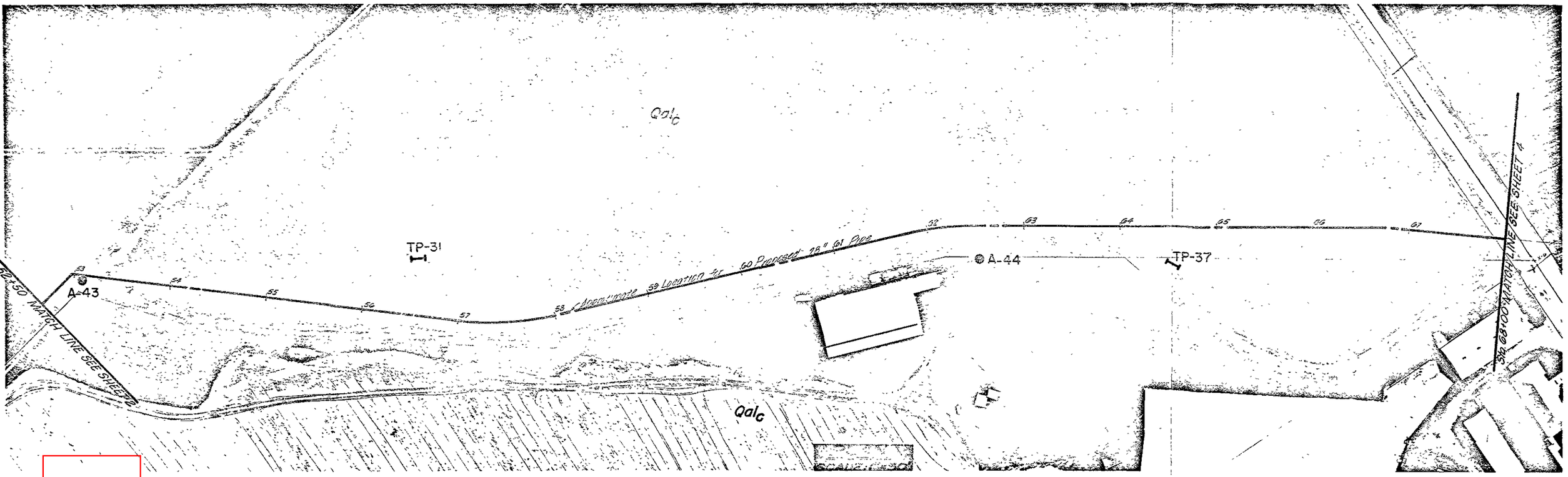
PLAN AND PROFILE SHEET 2

Checked by T.O. Hunt Date 5-22-79

Approved by R. Alvarez Date 6-22-79

Project No. 2013

Figure No. 15



DESCRIPTION	DATE	APPR

REFERENCE INFORMATION AND NOTES

PHOTOGRAPHY BY AIR-PHOTO CO., INC. DATE: 3-20 79 RECTIFICATION BY AIR-PHOTO CO., INC.

DATE
DESIGN
DRAWN
CHECKED

Santa Clara Valley Water District

ENGINEERING CERTIFICATION — PROJECT ENGINEER R.C.E. NO 229-8

ENGINEERING APPROVAL — DIVISION ENGINEER R.E. NO 14455

Earth Sciences Associates
Palo Alto, California

CROSS VALLEY PIPELINE
PLAN AND PROFILE SHEET 3

Checked by T.O. Hunt Date 6-22-79
Approved by R. Alvarez Date 6-22-79

Project No. 2013 | Figure No. 16

COYOTE PUMPING PLANT
(U.S. Department of the Interior, Bureau of Reclamation, 1983)

SI METRIC

GEOLOGIC LOG OF HOLE NO. CPPDH-2 SHEET 1 OF

PROJECT San Felipe Div., CVP FEATURE Coyote Pumping Plant AREA Center of Pumping Plant STATE California

LOCATION N 73 597.3 E 508 647.3 GROUND ELEV(m) 125.0 m ANGLE FROM HORIZ(°) 90°

BEGUN 12/3/82 FINISHED 12/15/82 DEPTH TO BEDROCK(m) N/A TOTAL DEPTH(m) 30.88 m BEARING(°) N/A

DEPTH TO WATER(m) See Notes LOGGED BY Ted Bruce REVIEWED BY Dave Sparks

Driller:
R. Farrell

Drill Rig:
Longyear HC-150
2520.2010

Drilling Methods:
From 0.0 to 30.88 m drilled with a 4x5 1/2" diamond bit and a 1.52 m split tube inner barrel with bentonite mud. The 4x5 1/2" bit drills a 5 1/2" (140 mm) diameter hole and a 4" (102 mm) diameter core.

Drilling Conditions:
0.0 to 1.17 m: Mostly fast and uneven.
1.17 to 7.65 m: Mostly slow and smooth with occasional block-offs.
7.65 to 17.60 m: Mostly slow to medium fast and smooth.
17.60 to 30.88 m: Mostly medium slow and smooth except slow and uneven and blocked off from 23.61 to 24.02 m.

Caving Conditions:
None noted.

Casing Record:
Size: 6" (152 mm)

Casing Depth:	Interval Drilled:
--	0.0 - 1.17
0.91	1.17- 2.49
1.68	2.49- 3.89
2.74	3.89- 5.90
4.56	5.90-30.88

FIELD PERMEABILITY TEST (DESIGNATION E-18, EARTH MANUAL)

NOTES	DEPTH (metres) FROM (P, Cs, or Cm)	DEPTH (metres) TO	DIAMETER (mm)	LOSS (Q) litres/min	DIFFERENTIAL HEAD (H) (metres)	LENGTH OF TEST (L) (m)	PERMEABILITY (K) metres/year	PERCENT CORE RECOVERY	DEPTH SCALE (metres)	GRAPHIC LOG	ELEVATIONS (metres)	SAMPLES FOR TESTING
								26		SC		
								59				
							100					
								93				
								95				
								100		GW-GC		
							100	40	5			
								100				
								67				
								83				
								92			116.8	
										CL		
									ML	CL		
									SM			
								100	CL-ML	SM		
									10	CL		
								100	SM		113.9	
										SW-SM		
								100		SM		
									CL	SM	111.6	
								100		CL		
									15	SC		
								100		SM		
										CL		
								100		SM		
										CL		
								100		SC		
									SW-SC			
								100		SM		
									20	SW-SC		
								100			103.5	
								100		GC		
								100				
								100				

CLASSIFICATION AND PHYSICAL CONDITION
0.0 to 30.88 m
QUATERNARY ALLUVIUM

0.0 to 0.7 m CLAYEY SAND: approx. 45% coarse to fine, subrounded to subangular sand; approx. 35% fines with medium plasticity, medium toughness, med-dry strength; approx. 20% coarse to fine, subrounded to subangular gravel; maximum size, 75 mm; moist, brown, dense with 40% loose; no reaction with HCl.

0.7 to 8.20 m WELL GRADED GRAVEL WITH COBBLES AND A TRACE OF BOULDERS: approx. 55% coarse to fine, subrounded to subangular gravel; approx. 35% coarse to fine, subrounded to subangular sand; approx. 10% fines with low to medium plasticity, low to medium toughness; low to medium dry strength; moist, brown, dense with 30% loose; no reaction with HCl, except moderate reaction locally on calcite cemented sandstone cobbles.
TOTAL SAMPLE (BY VOLUME): approx. 15% 75 to 125 mm subangular to subrounded cobbles; approx. 5% plus 125 mm subrounded to subangular cobbles; remainder minus 75 mm; maximum size, 325 mm.

8.20 to 18.61 m LEAN CLAY: approx. 90% fines with medium plasticity, medium toughness, medium dry strength; approx. 10% fine, subangular, sand; maximum size, fine sand; moist, brown mottled gray, firm to hard; no reaction to HCl. Sampled from 9.53 to 9.63 m and 13.90 to 14.00 m.

8.53 to 8.66 m SANDY SILT: approx. 70% fines with low plasticity, low toughness, low dry strength, slow dilatancy; approx. 30% fine sand; maximum size, fine sand; moist, brown mottled gray, firm; no reaction with HCl.

9.18 to 9.30 m SILTY SAND: approx. 70% predominantly fine, subrounded sand; approx. 30% fines with low plasticity, low toughness, low dry strength, slow to quick dilatancy; maximum size, medium sand; moist, brown, dense; no reaction with HCl.

9.92 to 10.23 m SILTY SAND: similar to interval 9.18 to 9.30 m.

(Notes continued)

HOLE SIZES, CASING, CEMENTING, AND COMPLETION:

COMMENTS:

FORMULAS USED TO COMPUTE PERMEABILITY:

$$K = \frac{Q}{2\pi LH} \log_e \frac{L}{r}$$ WHEN L GREATER THAN OR EQUAL 10r

$$K = \frac{Q}{2\pi LH} \sin^{-1} \frac{L}{2r}$$ WHEN L LESS THAN 10r AND GREATER THAN OR EQUAL r

SI METRIC

GEOLOGIC LOG OF HOLE NO. CPPDH-2 SHEET 2 OF 3

PROJECT San Felipe Div., ICVP FEATURE Coyote Pumping Plant AREA Center of Pumping Plant STATE California

LOCATION N 73 597.3 E 508 647.3 GROUND ELEV(m) 125.0 m ANGLE FROM HORIZ(°) 90°

BEGUN 12/3/82 FINISHED 12.15/82 DEPTH TO BEDROCK(m) N/A TOTAL DEPTH(m) 30.88 m BEARING(°) N/A

DEPTH TO WATER(m) See Notes LOGGED BY Ted Bruce REVIEWED BY Dave Sparks

NOTES	FIELD PERMEABILITY TEST (DESIGNATION E-18, EARTH MANUAL) DEPTH (metres) FROM (P, Cs or Cm)	DEPTH (metres) TO	DIAMETER (mm)	LOSS (Q) (litres/min	DIFFERENTIAL HEAD (H) (metres)	LENGTH OF TEST (t) (min)	PERMEABILITY (K) metres/year	PERCENT CORE RECOVERY	DEPTH SCALE (metres)	CLASSIFICATION INTERVALS DEPTHS (metres)	ELEVATIONS (metres)	SAMPLES FOR TESTING	CLASSIFICATION AND PHYSICAL CONDITION
Fluid Return: 0.0 to 19.53 m 98-100% 19.53 to 23.61 m 70-80% 23.61 to 30.88 m 80-95% Started losing drill mud at 19.53m. Lost 40 to 65% of drill mud while advancing casing from 0.0 to 2.74 m. Total Time Required To Complete Hole: 91 Hours (including 3.5 hours downtime). Hole Completion: Flushed hole with clear water. Installed 30.88 m of 1 1/2" (38mm) PVC pipe with the lower 20 m perforated. Water Level: None reported while drilling hole. Date: Depth: 1/10/83 7.8 m								100 100 100 100	30	GC 94.1			11.14 to 12.23 m WELL GRADED SAND: approx. 55% coarse to fine, subrounded to subangular sand; approx. 35% coarse to fine, subrounded to subangular gravel; approx. 10% non-plastic fines; maximum size, 35 mm; moist, brown, loose; no reaction with HCl. Sampled from 11.90 to 12.00 m. 12.23 to 12.93 m SILTY SAND: similar to interval 9.18 to 9.30 m. 13.12 to 13.43 m SILTY SAND: similar to interval 9.18 to 9.30 m. 14.75 to 15.13 m CLAYEY SAND: approx. 65% predominantly fine, subrounded to subangular sand; approx. 35% fines with medium plasticity, medium toughness, medium dry strength; maximum size, medium sand; moist, brown, dense; no reaction with HCl. 15.13 to 15.86 m SILTY SAND: similar to interval 9.18 to 9.30 m. 16.69 to 17.37 m SILTY SAND: similar to interval 9.18 to 9.30 m. 18.00 to 18.26 m SANDY CLAY: approx. 70% fines with medium plasticity, medium toughness, medium dry strength; approx. 30% predominantly fine sand; maximum size, medium sand; moist, brown, firm to hard; no reaction with HCl. Sampled from 18.00 to 18.10 m. 18.61 to 19.00 m CLAYEY SAND: approx. 60% predominantly fine, subrounded to subangular sand; approx. 40% fines with medium plasticity, medium toughness, medium dry strength, trace of fine, subrounded gravel; maximum size, 10 mm; moist, brown, dense, no reaction with HCl. 18.79 to 18.92 m CLAYEY SAND: approx. 60% coarse to fine, subrounded to subangular sand; approx. 20% fines with low to medium plasticity, low to medium toughness, medium dry strength; approx. 20% fine, subrounded to subangular gravel; maximum size, 20 mm; moist, brown, dense; no reaction with HCl. (Notes continued)

HOLE SIZES, CASING, CEMENTING, AND COMPLETION:

COMMENTS:

FORMULAS USED TO COMPUTE PERMEABILITY:

$$K = \frac{Q}{2\pi LH} \log_e \frac{L}{r}$$ WHEN L GREATER THAN OR EQUAL 10r

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r}$$ WHEN L LESS THAN 10r AND GREATER THAN OR EQUAL r

SI METRIC

SI METRIC

GEOLOGIC LOG OF HOLE NO. CPPDH-2 SHEET 3 OF 3

PROJECT San Felipe Div., CVP FEATURE Coyote Pumping Plant AREA Center of Pumping Plant STATE California

LOCATION N 73 597.3 E 508 647.3 GROUND ELEV(m) 125.0 m ANGLE FROM HORIZ(°) 90°

BEGUN 12/3/82 FINISHED 12/15/82 DEPTH TO BEDROCK(m) N/A TOTAL DEPTH(m) 30.88 m BEARING(°) N/A

DEPTH TO WATER(m) See Notes LOGGED BY Ted Bruce REVIEWED BY Dave Sparks

NOTES	FIELD PERMEABILITY TEST (DESIGNATION E-18, EARTH MANUAL) DEPTH (metres) FROM (P, Cs, or Cm)	TO	DIAMETER (mm)	LOSS (Q) litres/min	DIFFERENTIAL HEAD (H) (metres)	LENGTH OF TEST (L) (m)	PERMEABILITY (K) metres/year	PERCENT CORE RECOVERY	DEPTH SCALE (metres)	CLASSIFICATION INTERVALS DEPTHS (metres)	ELEVATIONS (metres)	SAMPLES FOR TESTING	CLASSIFICATION AND PHYSICAL CONDITION
													19.00 to 21.50 m WELL GRADED SAND: approx. 50% coarse to fine, subrounded to subangular sand; approx. 40% coarse to fine, subrounded to subangular gravel; approx. 10% fines with low to medium plasticity, low to medium toughness, low to medium dry strength; maximum size, 60 mm; moist, brown, dense; no reaction with HCl. Sampled from 21.30 to 21.40 m. 19.50 to 19.91 m SILTY SAND: approx. 55% coarse to fine, subrounded to subangular sand; approx. 35% fines with low plasticity, low toughness, low dry strength, slow dilatancy; approx. 10% coarse to fine, subrounded to subangular gravel; maximum size, 30 mm; moist, brown, dense; no reaction with HCl. 21.50 to 30.88 m CLAYEY GRAVEL WITH COBBLES: approx. 50% coarse to fine, subrounded to subangular gravel; approx. 35% coarse to fine, subrounded to subangular sand; approx. 15% fines with low to medium plasticity, low to medium toughness, low to medium dry strength; moist, brown, dense; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 10% 75 to 125 mm, subrounded to subangular cobbles; trace of plus 125 mm subrounded cobbles; remainder minus 75mm; maximum size, 150 mm.

HOLE SIZES, CASING, CEMENTING, AND COMPLETION:

COMMENTS:

FORMULAS USED TO COMPUTE PERMEABILITY:

$$K = \frac{Q}{2\pi LH} \log_e \frac{L}{r}$$ WHEN L GREATER THAN OR EQUAL 10r

$$K = \frac{Q}{2\pi LH} \sinh^{-1} \frac{L}{2r}$$ WHEN L LESS THAN 10r AND GREATER THAN OR EQUAL r

SI METRIC

Bureau of Reclamation

SI METRIC

STANDARD PENETRATION TEST HOLE NO. CPPSPT-1 SHEET 1 OF 1

PROJECT San Felipe Div., CVP FEATURE Coyote Pumping Plant AREA Center of Pumping Plant STATE California

COORDS. N. 73 595.7 E 508 646.7 GROUND ELEV(m) 125.0 m ANGLE FROM HORIZ(°) 90°

BEGUN 12-16-82 FINISHED 12-20-82 DEPTH TO BEDROCK(m) N/A TOTAL DEPTH(m) 18.76 m BEARING(°) N/A

DEPTH TO WATER(m) None taken LOGGED BY Barry Lee and Ted Bruce REVIEWED BY Dave Sparks

NOTES	STANDARD PENETRATION TEST (DESIGNATION E-21, EARTH MANUAL) NUMBER OF BLOWS	PENETRATION (mm)	BLOW COUNT (N) 63.5 kg HAMMER-762 mm DROP 20 40 60 80	PERCENT MOISTURE	DEPTH SCALE (metres)	PERCENT CORE RECOVERY	GRAPHIC LOG	SAMPLES FOR TESTING
Driller: R. Farrell Drill Rig: Longyear HC-150 2520.2010 Drilling Methods and Equipment Used: The SPT sampler is a Sprague and Henwood open split barrel type that is 24" (0.61 m) long with a maximum sample recovery length of 18" (0.46 m) and 1 3/8" (35 mm) i.d. A 4 1/2" (114 mm) tricone roller bit was used to rockbit down to 8.30 m, starting depth of the sampling. A 2 15/16" (75 mm) tricone roller bit was used to rockbit 5 ft. (1.52 m) from the start of the sample depth to the top of the next sample interval. For the sample intervals see below. A standard anvil safety type hammer weighing 140 lbs. (63.6 kg), 1.10 m in length and 130 mm in diameter was used to drive the sample. The rope cathead system used has a 160 mm diameter mast sheave, 170 mm diameter cathead with a counter-clockwise rotation; and 1" (25 mm) diameter manilla new rope with two cathead wraps. Acker BW size rods weighing 4.3 lbs. per ft. were used. NX casing was used in the hole to a depth of 7.32 m.						0 to 8.30 m NO RECOVERY 8.30 to 18.76 QUATERNARY ALLUVIUM		
					5	NO RECOVERY	ROCKBITTED	
	14	304		30		89	SM-ML	
	11	304		28	10	94	CL	
	16	304		13		83	CL	
	19	304		29		83	SW-SM	
	17	304		29		100	SM	
	22	304		19	15	72	CL	
	17	304		28		89	SM-ML	
	29	304		12		98	CL	
					20			

The following descriptions are based on the samples obtained from the test intervals. This represents approx. 30% of the drill hole between 8.30 and 18.76 m. Contacts reported below are approximate.

8.30 to 8.63 m SILTY SAND: approx. 50% fine, subrounded sand; approx. 50% non-plastic fines, quick dilatancy; maximum size, fine sand; moist, brown, dense; no reaction with HCl. Sampled from 8.30 to 8.63 m.

8.63 to 11.25 m LEAN CLAY: approx. 95% fines with low to medium plasticity, low to medium toughness, medium dry strength, very slow dilatancy; approx. 5% fine sand; maximum size, fine sand; moist, brown mottled gray, firm to hard; no reaction with HCl. Sampled from 9.60 to 10.00 m.

11.25 to 11.36 m SANDY CLAY: approx. 60% fines with medium plasticity, medium toughness, medium dry strength; approx 40% predominantly fine, subrounded to subangular sand; trace of fine, subrounded to subangular gravel; maximum size, 20 mm; moist, brown, dense; no reaction with HCl. Sampled from 11.25 to 11.36 m.

11.36 to 12.62 m WELL GRADED SAND: approx. 60% coarse to fine, subrounded to subangular sand; approx. 30% fine, subrounded to subangular gravel; approx. 10% non-plastic fines; maximum size, 15 mm; moist, brown, loose; no reaction with HCl. Sampled from 12.25 to 12.55 m.

12.62 to 13.80 m SILTY SAND: similar to interval 8.30 to 8.63 m; but with 60% sand. Sampled from 12.62 to 12.75m.

13.80 to 15.30 m LEAN CLAY: approx. 95% fines with medium plasticity, medium toughness, medium dry strength; approx 5% fine sand; maximum size, fine sand; moist, brown with occasional rust mottling; firm to hard; no reaction with HCl. Sampled from 13.80 to 14.25 m.

15.30 to 17.26 m SILTY SAND: similar to interval 8.30 to 8.63 m. Sampled from 15.30 to 15.75 and 16.80 to 17.20 m.

17.26 to 18.76 m SANDY CLAY: similar to interval 11.25 to 11.36 m. Sampled from 18.30 to 18.75 m.

Sample Intervals:
8.30 - 8.76
9.60 -10.06
10.90-11.36
12.30-12.76
13.80-14.26
15.30-15.76
16.80 -17.26
18.30 -18.76

Caving Conditions:
None reported.

Fluid Return:
0.0 to 18.76 m 95%

Total Time Required to Complete Hole:
30 hours.

Hole Completion:
Removed casing and backfilled hole.

SI METRIC

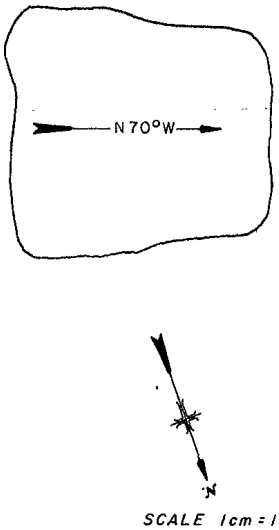
SFCO-27 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-1

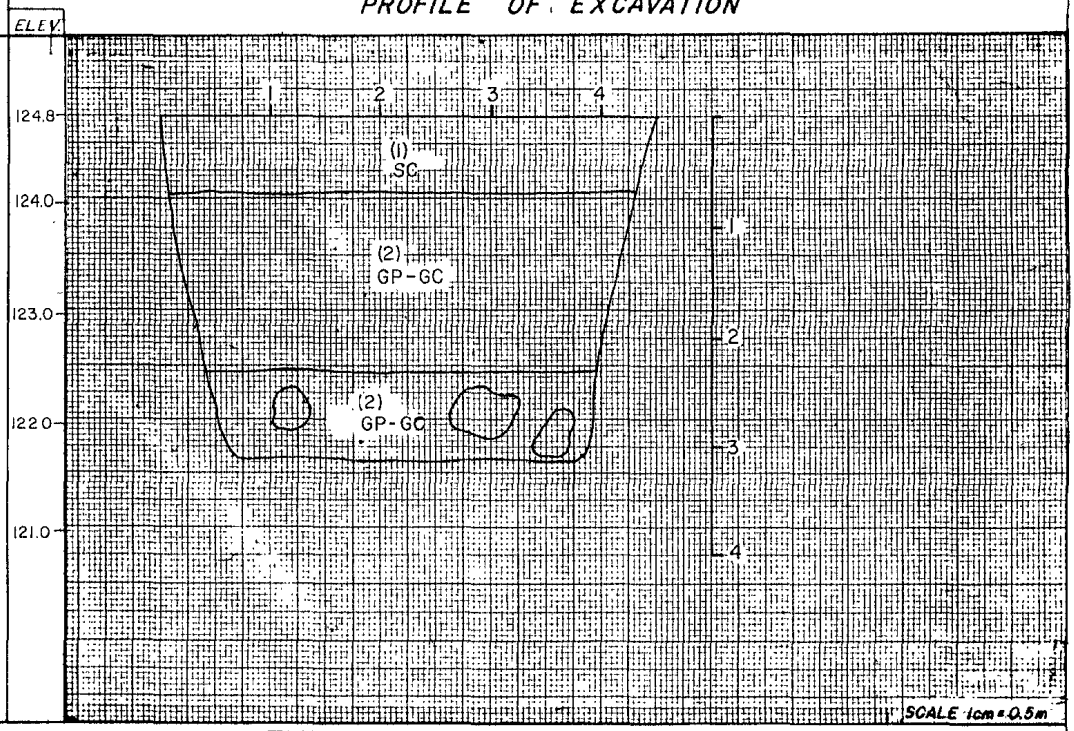
Feature Coyote Pumping Plant Location Near SE edge of Pumping Plant Project San Felipe Div., CVP State California
Coordinates: N 73 572 E 508 664 Ground Elevation 124.8 m Bottom Elevation 121.7 m
Method of Excavation Backhoe* Total Depth 3.1 m Size 4.5 m x 4.5 m Depth to Water Table Dry
Begun 12/11/82 Finished 12/11/82 Operator Jack Scott Geologist Ted Bruce

Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.1 m because of moderate caving. Note dimensions of test pit to reach a depth of 3.1 m.	0.0 to 0.7 m CLAYEY SAND: approx. 55% coarse to fine, subrounded to subangular sand; approx. 40% fines with medium plasticity, medium toughness, medium dry strength; approx. 5% coarse to fine, subrounded to subangular gravel; maximum size, 60 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist to wet, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.7 to 3.3 m POORLY GRADED GRAVEL WITH COBBLES AND BOULDERS: approx. 55% coarse to fine, subrounded to subangular gravel; approx. 35% coarse to fine, subrounded to subangular sand; approx. 10% fines with low to medium plasticity, low to medium toughness, low to medium dry strength; no reaction with HCl; boulders encountered below 2.3 m. TOTAL SAMPLE (BY VOLUME): approx. 15% 75 to 125 mm subrounded cobbles; approx. 10% plus 125 mm subrounded cobbles; remainder minus 75 mm; maximum size, 500 mm. IN-PLACE CONDITION: loose with 30% dense to 3.0 m, dense from 3.0 to 3.3 m, homogeneous, moist, dark brown; moderate caving. IN-PLACE DENSITY at 1.5 m: Dry Density-1932 kg/m^3, Moisture Content-8%, Percent Relative-86% and at 3.1 m: Dry Density-2047 kg/m^3, Moisture Content-9%, Percent Relative-97%. GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-1

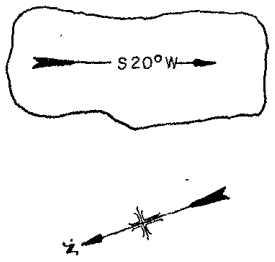
SFCO-2 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-2

Feature: Coyote Pumping Plant | Location: Near W edge of Pumping Plant | Project: San Felipe Div., CVP | State: California
Coordinates: N 73 608 E 508 618 | Ground Elevation: 125.0 m | Bottom Elevation: 122.2 m
Method of Excavation: Backhoe* | Total Depth: 2.8 m | Size: 2.0mx 4.5 m | Depth to Water Table: Dry
Begun: 12-10-82 | Finished: 12-10-82 | Operator: Jack Scott | Geologist: Ted Bruce

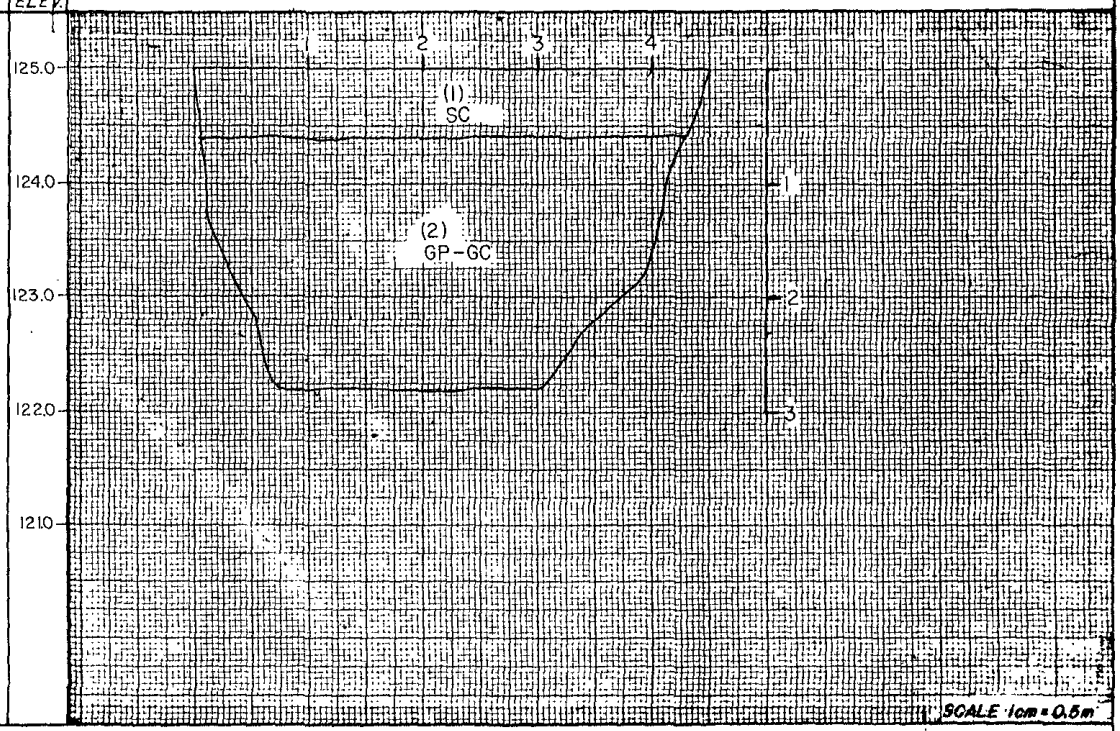
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 2.8 m because of moderate to severe caving. Note dimensions of test pit.	0.0 to 0.6 m CLAYEY SAND: approx. 50% coarse to fine, subrounded to subangular sand; approx. 35% fines with medium plasticity, medium toughness, medium dry strength; approx. 15% coarse to fine, subrounded to subangular gravel; maximum size, 75 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.6 to 2.8 m POORLY GRADED GRAVEL WITH COBBLES: approx. 60% coarse to fine, subrounded to subangular gravel; approx. 35% coarse to fine, subrounded to subangular sand; approx. 5% fines with low plasticity, low toughness, low to medium dry strength; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 10% 75 to 125 mm subrounded cobbles; approx. 5% plus 125 mm subrounded cobbles; remainder minus 75 mm; maximum size, 225 mm. IN-PLACE CONDITION: loose, homogeneous, moist, dark brown; moderate to severe caving. IN-PLACE DENSITY at 1.5 m: Dry Density-1959 kg/m^3, Moisture Content-8%, Percent Relative-72% GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-2

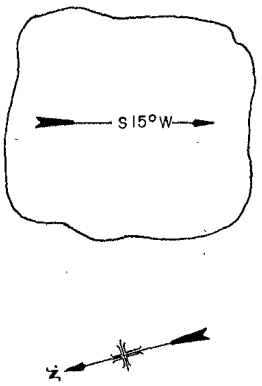
SFCO-27 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-3

Feature Coyote Pumping Plant Location Near Flowmeter West of Pumping Plant Project San Feline Div., CVP State California
Coordinates: N 73 610 E 508 580 Ground Elevation 124.6 m Bottom Elevation 121.4 m
Method of Excavation Backhoe* Total Depth 3.8 m Size 4.2 m x 4.4 m Depth to Water Table Dry
Begun 12-10-82 Finished 12-10-82 Operator Jack Scott Geologist Ted Bruce

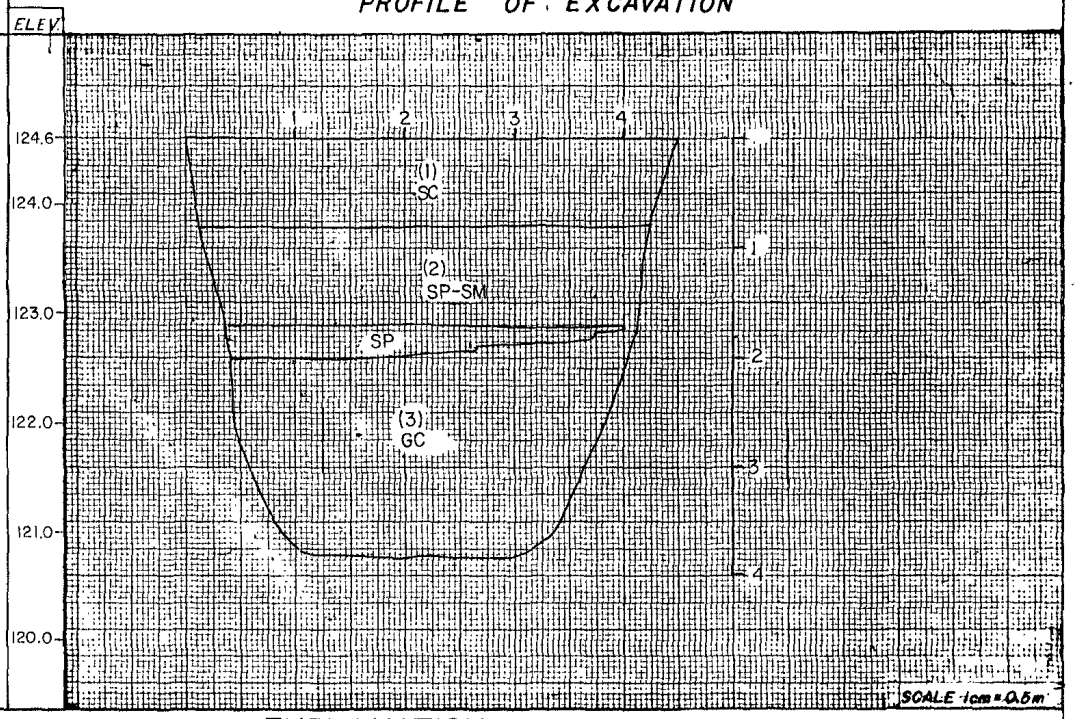
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.8 m because of moderate caving. Note dimensions of test pit to reach a depth of 3.8 m.	0.0 to 0.8 m CLAYEY SAND: approx. 55% coarse to fine, subrounded to subangular sand; approx. 40% fines with medium plasticity, medium toughness, medium dry strength; approx. 5% coarse to fine, subrounded to subangular gravel; maximum size, 70 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 25% loose, homogeneous, moist, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.8 to 2.0 m POORLY GRADED SAND WITH TRACE OF COBBLES: approx. 70% coarse to fine, subrounded to subangular sand; approx. 20% coarse to fine, subrounded to subangular gravel; approx. 10% fines with low plasticity, low toughness, low to medium dry strength; no reaction with HCl; contains a 300 mm thick SP lense from 1.7 to 2.0 m. TOTAL SAMPLE (BY VOLUME): trace of 75 to 125 mm subrounded cobbles; maximum size, 125 mm. IN-PLACE CONDITION: loose with 30% dense, homogeneous with discontinuous lenses, moist, dark brown; moderate caving. IN-PLACE DENSITY at 1.7 m: Dry Density-1629 kg/m^3, Moisture Content-10%, Percent Relative-70% GEOLOGIC INTERPRETATION: Quaternary Alluvium. 2.0 to 3.8 m CLAYEY GRAVEL WITH COBBLES: approx. 55% coarse to fine, subrounded to subangular gravel; approx. 30% coarse to fine, subrounded to subangular sand; approx. 15% fines with medium plasticity, medium toughness, medium dry strength; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 5% 75 to 125 mm subrounded cobbles; trace of plus 125 mm subangular to subrounded cobbles; remainder minus 75 mm; maximum size, 250 mm. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; moderate caving. IN-PLACE DENSITY at 3.2 m: Dry Density-1881 kg/m^3, Moisture Content-10%, Percent Relative-96% GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-3

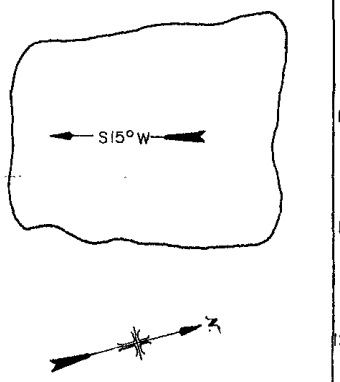
SFCO[illegible]7 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-4

Feature Coyote Pumping Plant Location Near E edge of Transformer Area Project San Felipe Div., CVP State California
Coordinates: N 73 600 E 508 670 Ground Elevation 125.0 m Bottom Elevation 122.0 m
Method of Excavation Backhoe* Total Depth 3.0 m Size 4.0 m x 4.5 m Depth to Water Table Dry
Begun 12-11-82 Finished 12-11-82 Operator Jack Scott Geologist Ted Bruce

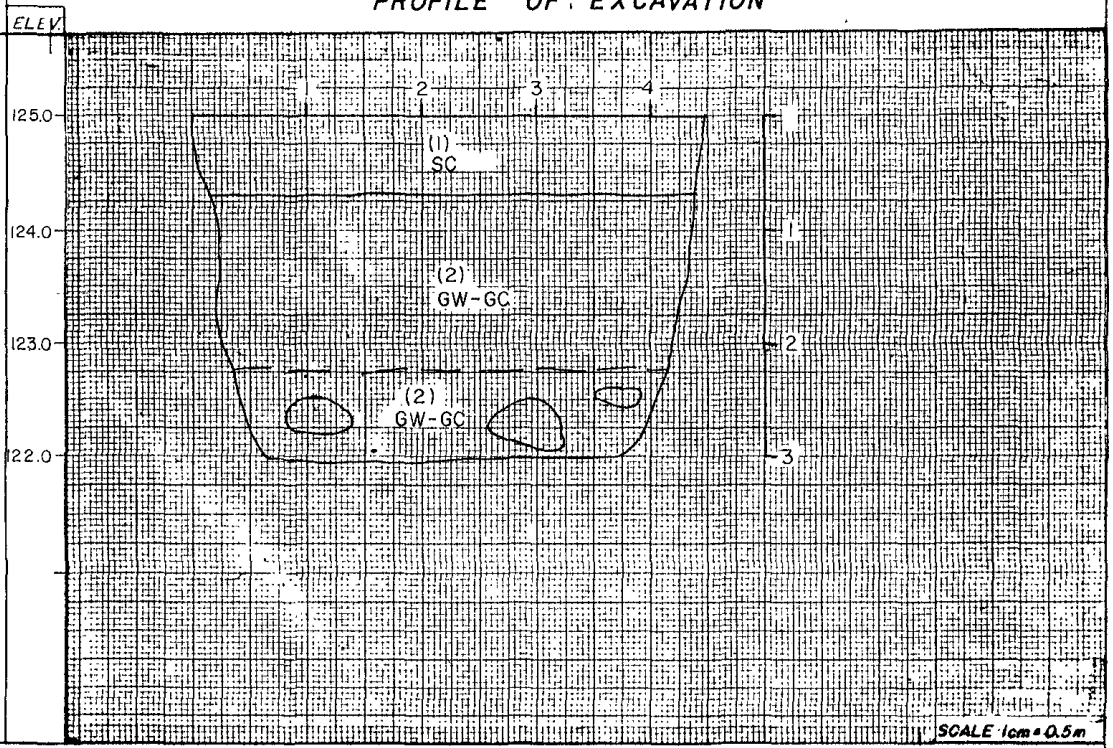
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.0 m because of moderate to severe caving. Note dimensions of test pit to reach a depth of 3.0 m.	0.0 to 0.7 m CLAYEY SAND: approx. 60% coarse to fine, subrounded to subangular sand; approx. 35% fines with medium plasticity, medium toughness, medium dry strength; approx. 5% coarse to fine, subrounded to subangular gravel; maximum size, 75 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.7 to 3.4 m WELL GRADED GRAVEL WITH COBBLES AND BOULDERS: approx. 60% coarse to fine, subrounded to subangular gravel; approx. 30% coarse to fine, subrounded to subangular sand; approx. 10% fines with low to medium plasticity, low to medium toughness, medium dry strength; no reaction with HCl; boulders encountered at 2.2 m. TOTAL SAMPLE (BY VOLUME): approx. 15% 75 to 125 mm subrounded to subangular cobbles; approx. 10% plus 125 mm subrounded to subangular cobbles; remainder minus 75 mm; maximum size, 450mm. IN-PLACE CONDITION: loose, homogeneous, moist, dark brown; moderate to severe caving. IN-PLACE DENSITY at 1.5 m: Dry Density-1953 kg/m^3, Moisture Content-10%, Percent Relative-87% and at 3.2 m: Dry Density-1983 kg/m^3, Moisture Content-9%, Percent Relative-86%. GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



SCALE 1cm = 0.5m

EXPLANATION

TEST PIT NO. CPPTP-4

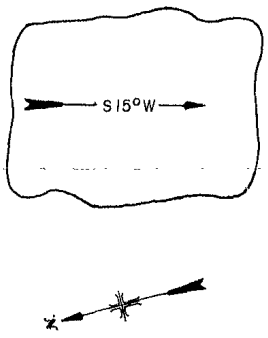
SFCO-27 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-5

Feature Coyote Pumping Plant Location Center of Substation Project San Felipe Div., CVP State California
Coordinates: N 73 640 E 508 665 Ground Elevation 125.3 m Bottom Elevation 122.3 m
Method of Excavation Backhoe* Total Depth 3.0 m Size 3.5 m x 4.5 m Depth to Water Table Dry
Begun 12-11-82 Finished 12-11-82 Operator Jack Scott Geologist Ted Bruce

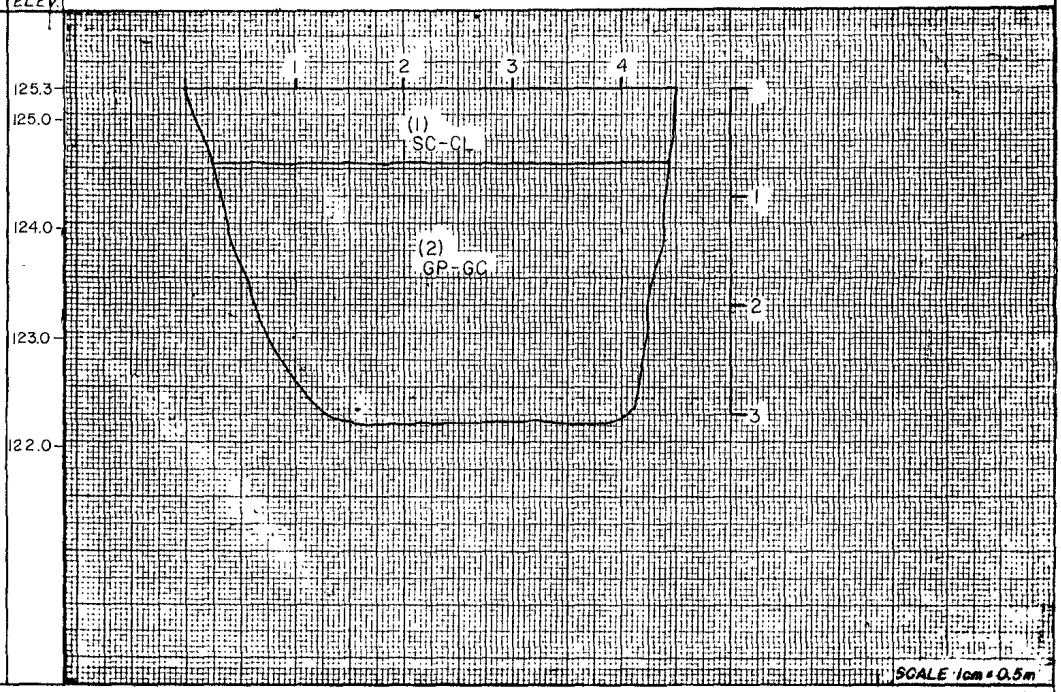
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.0 m due to moderate caving. Note dimensions of test pit to reach a depth of 3.0 m.	0.0 to 0.7 m CLAYEY SAND: approx. 45% coarse to fine, subrounded to subangular sand; approx. 45% fines with medium plasticity, medium toughness, medium dry strength; approx. 10% coarse to fine, subrounded to subangular gravel; maximum size, 75 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.7 to 3.2 m POORLY GRADED GRAVEL WITH COBBLES: approx. 60% coarse to fine, subrounded to subangular gravel; approx. 30% coarse to fine, subrounded to subangular sand; approx. 10% fines with low plasticity, low toughness, low dry strength; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 10% 75 to 125 mm subrounded to subangular cobbles; trace of plus 125 mm subrounded cobbles; remainder minus 75 mm; maximum size, 300 mm. IN-PLACE CONDITION: loose with 20% dense, homogeneous, moist to wet, dark brown; moderate caving. IN-PLACE DENSITY at 1.6 m: Dry Density-1932 kg/m^3, Moisture Content-9%, Percent Relative-82% and at 3.0 m: Dry Density-1988 kg/m^3, Moisture Content-9%, Percent Relative-76%. GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-5

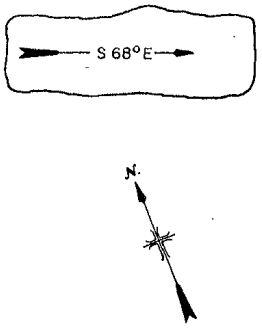
SFCO-27 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-6

Feature Coyote Pumping Plant Location Maintenance Building Project San Felipe Div., CVP State California
Coordinates: N 73 687 E 508 678 Ground Elevation 125.7 m Bottom Elevation 122.7 m
Method of Excavation Backhoe* Total Depth 3.0 m Size 1.5 m x 4.5 m Depth to Water Table Dry
Begun 12-10-82 Finished 12-10-82 Operator Jack Scott Geologist Ted Bruce

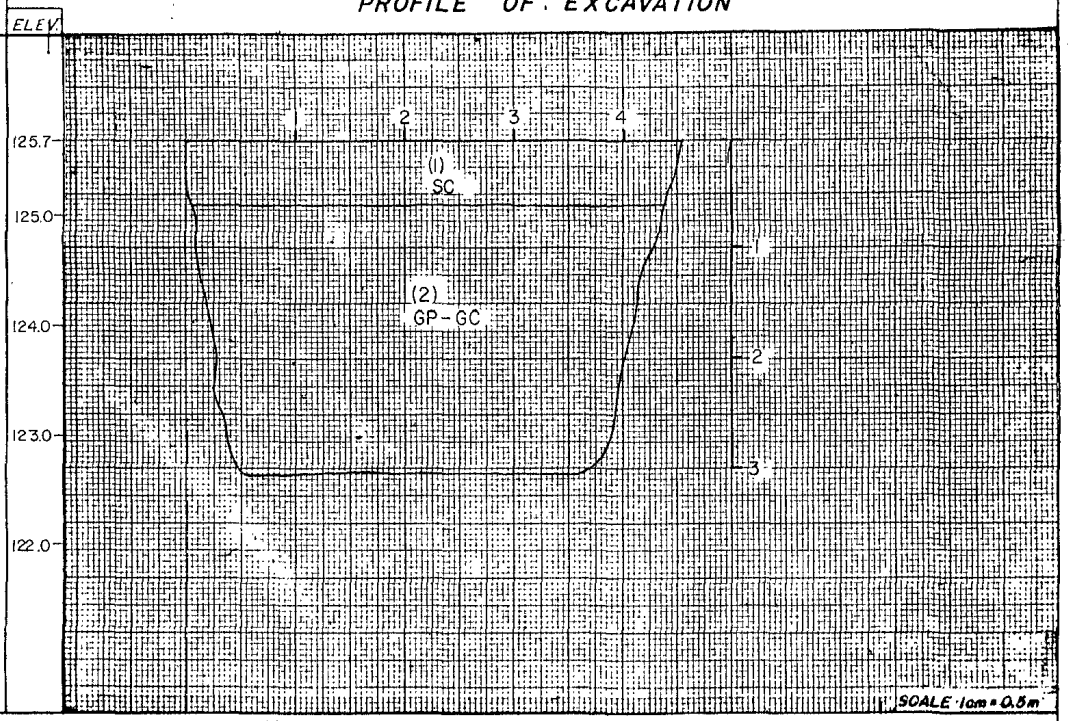
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.0 m due to moderate caving. Note dimensions of test pit to reach a depth of 3.0 m.	0.0 to 0.6 m CLAYEY SAND: approx. 60% coarse to fine, subrounded to subangular sand; approx. 35% fines with medium plasticity, medium toughness, medium dry strength; approx. 5% coarse to fine, subrounded to subangular gravel; maximum size, 65 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; minor caving. *GEOLOGIC INTERPRETATION: Quaternary Alluvium.* 0.6 to 3.2 m POORLY GRADED GRAVEL WITH COBBLES: approx. 55% coarse to fine, subrounded to subangular gravel; approx. 35% coarse to fine, subrounded to subangular sand; approx. 10% fines with low plasticity, low toughness, low dry strength; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 5% 75 to 125 mm subrounded cobbles; trace of plus 125 mm subrounded cobbles; remainder minus 75 mm; maximum size, 200 mm. IN-PLACE CONDITION: dense to 2.0 m, loose below 2.0 m, homogeneous, moist to wet, dark brown; moderate caving. IN-PLACE DENSITY at 1.7 m: Dry Density-2012 kg/m^3, Moisture Content-8%, Percent Relative-97% and at 3.0 m: Dry Density-1908 kg/m^3, Moisture Content-7%, Percent Relative-61%. GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-6

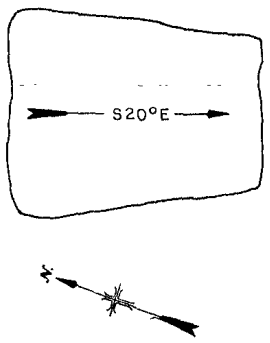
SFCO-27 (4-80)

GEOLOGIC LOG OF TEST PIT NO. CPPTP-7

Feature: Coyote Pumping Plant | Location: Santa Clara Conduit | Project: San Felipe Div., CVP | State: California
Coordinates: N 73 534 E 508 696 | Ground Elevation: 124.5 m | Bottom Elevation: 121.4 m
Method of Excavation: Backhoe* | Total Depth: 3.1 m | Size: 3.8 m x 4.5 m | Depth to Water Table: Dry
Begun: 12-13-82 Finished: 12-13-82 | Operator: Jack Scott | Geologist: Ted Bruce

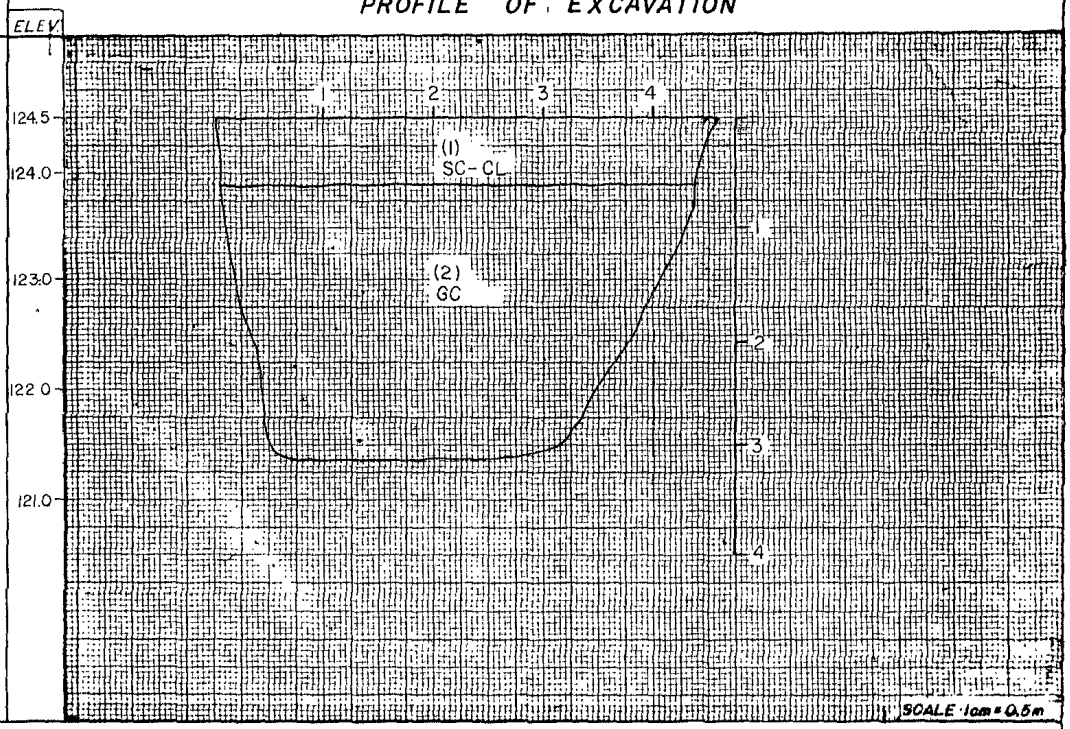
Remarks on drilling conditions, moisture, etc	CLASSIFICATION AND DESCRIPTION
Case Tractor, Model 780CK with an Extendahoe (Backhoe) and a 915 mm bucket. Excavation Time: 20 minutes Caving: Only excavated to 3.1 m due to moderate caving. Note dimensions of test pit to reach a depth of 3.1 m.	0.0 to 0.6 m CLAYEY SAND: approx. 50% coarse to fine, subrounded to subangular sand; approx. 45% fines with medium plasticity, medium toughness, medium dry strength; approx. 5% coarse to fine, subrounded to subangular gravel; maximum size, 75 mm; no reaction with HCl. IN-PLACE CONDITION: dense with 30% loose, homogeneous, moist, dark brown; minor caving. GEOLOGIC INTERPRETATION: Quaternary Alluvium. 0.6 to 3.3 m CLAYEY GRAVEL WITH COBBLES AND A TRACE OF BOULDERS: approx. 55% coarse to fine, subrounded to subangular gravel; approx. 30% coarse to fine, subrounded to subangular sand; approx. 15% fines with low plasticity, low toughness, low to medium dry strength; no reaction with HCl. TOTAL SAMPLE (BY VOLUME): approx. 15% 75 to 125 mm subrounded cobbles; approx. 10% plus 125 mm subrounded cobbles; remainder minus 75 mm; maximum size, 350 mm. IN-PLACE CONDITION: dense with 20% loose, homogeneous, moist, dark brown; moderate caving. IN-PLACE DENSITY at 1.5 m: Dry Density-1999 kg/m^3, Moisture Content-10%, Percent Relative-108% and at 3.1 m: Dry Density-2089 kg/m^3, Moisture Content-9%, Percent Proctor Maximum-115% GEOLOGIC INTERPRETATION: Quaternary Alluvium.

PLAN



SCALE 1cm = 1m

PROFILE OF EXCAVATION



EXPLANATION

TEST PIT NO. CPPTP-7

ENGEO
Expect Excellence